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THESIS

AN EVALUATION OF THE MANPOWER STAFFING SYSTEM FOR THE NAVAL FACILITIES ENGINEERING COMMAND'S FACILITIES ACQUISITION MISSION

by

Kenneth L. Rado

March 1987

Thesis Advisor: R. A. Weitzman

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This thesis describes and evaluates the manpower demand forecasting system used by the Naval Facilities Engineering Command (NAVFAC) both to obtain manpower resources for its facilities acquisition mission during the Planning, Programming and Budgeting process and to allocate these resources among its Engineering Field Divisions (EFDs). The method by which NAVFAC developed its manpower demand forecasting is assessed as being valid. This thesis shows that the accuracy of this model, developed in 1980 using FY 79 data, can be enhanced by using more recent data over a period of several fiscal years. This is done in this thesis using FY 85 and FY 86 data. Thesis research showed that this same model can be used as a baseline with a high degree of accuracy to allocate resources among the EFDs; however, an expanded data base is

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An Evaluation of the Manpower Staffing System for the Naval Facilities Engineering Command's Facilities Acquisition Mission

by

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Submitted in partial fulfillment of the
requirements for the degree of

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ABSTRACT

This thesis describes and evaluates the manpower demand forecasting system used by the Naval Facilities Engineering Command (NAVFAC) both to obtain manpower resources for its facilities acquisition mission during the Planning, Programming and Budgeting process and to allocate these resources among its Engineering Field Divisions (EFDs). The method by which NAVFAC developed its manpower demand forecasting is assessed as being valid. This thesis shows that the accuracy of this model, developed in 1980 using FY 79 data, can be enhanced by using more recent data over a period of several fiscal years. This is done in this thesis using FY 85 and FY 86 data. Thesis research showed that this same model can be used as a baseline with a high degree of accuracy to allocate resources among the EFDs; however, an expanded data base is crucial to improved accuracy. Other manpower staffing factors, not quantified in NAVFAC's staffing model, are described and their effects on staffing requirements appraised. The means by which EFDs internally allocate these resources among Divisions is evaluated, and recommendations for improvements are made.

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I. INTRODUCTION

How many people will we need? This is one of the most perplexing questions faced by a manager, or an organization, because it is so difficult to answer and so much is at stake. For the Naval Facilities Engineering Command (NAVFAC) and its six subordinate Engineering Field Divisions (EFDs), which are charged with designing and administering more than $6 billion in construction work per year, as well as managing and maintaining nearly five million acres of Navy and Marine Corps real estate with a facilities inventory worth more than $100 billion,[1] this is a particularly vital question. Consider that most managers have difficulty determining personnel needs for their own departments, magnify this by at least four major departments in an EFD, each department with staffs ranging from 50-400 people, project this through the six EFDs of NAVFAC, add a dozen or so staffing "factors" to complicate matters, and it is seen why manpower planning staffing is one of the most important and complex tasks confronting NAVFAC management.

With overstaffing, costs are excessive, people are not fully utilized, and productivity suffers. And when government organizations operate under austerely limited personnel ceilings, overstaffing in one department or organization means that fewer personnel resources are available to other departments/organizations. Understaffing leads to consequences just as bad, according to a study done for the Army Corps of Engineers by the Logistics Management Institute:

> It is apparent from historical information that greater design and construction workload is being performed than in the past and with fewer manpower resources. The historic USACE (U.S. Army Corps of Engineers) level of resource requirements for providing design and construction services is comparable to that of other public and private sector design and construction agents. Our previous studies on DoD construction and management costs lead us to believe that increasing the ratio of workload to manpower has resulted in increased costs in terms of customer dissatisfaction, failure of the facility to meet the need for which it was built, and increased change orders. [Ref. 1: p. 4]

It is apparent that understaffing leads to missed opportunities. Because of hiring and other personnel-action constraints, an EFD's work force cannot be added to or cut on short notice, or in some instances at all, without incurring substantial costs, in

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[1]Source: NAVFAC Code 05

terms of both money and productivity. Thus, manpower planning staffing is one of the keys to holding down personnel costs and stimulating productivity. With so much at stake one would think that, given the level of sophistication in management science, manpower staffing would be as exact a process as, say, forecasting the weather. Of course, forecasting the weather is *not* an *exact* science. Richard Fantzreb sums it up:

> But why has there been so little success in making human resource planning work? Primarily because it has proved to be quite difficult to forecast an organization's need for people. Is this a surprising statement? How many organizations can say with confidence whether they are overstaffed, understaffed, or properly staffed at a given moment in time? [Ref. 2: p. 859]

This thesis takes a practical look at the subject of manpower requirements forecasting. It explores the logic of the process, reviews the techniques, surveys some of the obstacles encountered in practice, points the way to sources of further information for the EFDs, and makes recommendations for improvements to current methods employed.

A. SCOPE OF THESIS

Although this research is primarily of interest to senior managers in the NAVFAC organization, the research analyses, recommendations, and conclusions can easily be adapted by the manager of any organization who is interested in determining manpower requirements. This thesis thus includes brief explanations of NAVFAC's organization and programs to aid the understanding of the uninitiated.

This thesis addresses the topic of "demand forecasting," which essentially answers the question: "How many people do we need?" Not addressed is a related question in personnel resource management: "How many people will we need to hire (or train)?" This latter aspect involves developing a detailed summary of each employee's skills and training background, construction of ***Replacement Charts*** which detail who will replace whom in the event of a job opening, and development of ***Replacement Summaries*** which supplement Replacement Charts and list likely replacements and their relative strengths and weaknesses for each job [Ref. 3: p. 120]. Investigating the hiring and training system at NAVFAC was considered beyond the scope of this thesis.

The first question, "How many people do we need?", for the EFDs, is determined by future workload, technology, productivity, contracting regulations, and a variety of other factors.

The second question can be approached only after the first is answered, and only after it has been determined how may present employees will be available at some future time to meet staffing needs. Finding out how many employees will be available in various skill categories after allowing for turnover, retirement, promotion, etc., is often called "supply forecasting." Determining the total number of employees required is then called "demand forecasting." The first question is answered by a demand forecast. The second question is answered by subtracting the supply forecast from the demand forecast. [Ref. 2: p. 850]

The scope of this thesis is also narrowed to studying demand forecasting and resource allocations for NAVFAC's EFD Facility Acquisition Mission,[2] which is embodied in Program IV and the Facility Support Contracting portion of Program IX, which together comprise approximately 65% of EFD staffing. Program IX staffing in this thesis refers only to Code 02 (Contracts) and Code 05 (Construction). The following is a brief explanation of NAVFAC's management by Programs, taken from the fiscal year 1986 NAVFAC Operating Plan:

> One of the basic precepts of the Command is that we staff through an organizational structure and we execute our mission and resources through a program structure. The organizations at Headquarters and the various field activities are broken down into work centers (departments, divisions, branches, sections, etc.), through which we gather together staffs of specific expertise and provide for personnel management. Through a properly staffed organizational structure, we attempt to have available the trained work force, in the types of field activities and in the required geographical areas, to provide the various products and services of our Command mission. [Ref. 4: p. 12]

Figures 1.1 and 1.2 depict the NAVFAC HQ organization and a "typical" EFD organization. EFDs carry out their mission in terms of seven Programs [Ref. 4: pp. 21-47]:

- Program II-- Planning and Real Estate. Formulates plans for land and facilities, acquires, leases and disposes of real property, and manages natural resources.
- Program III - Engineering and Design. Manages the design of facilities, applies high technology to improve design quality and productivity, develops design and construction criteria, and provides engineering consultation.
- Program IV - Construction. Manages world-wide construction of facilities for the Navy, Marine Corps, and other U.S. government organizations.
- Program VI - Seabees. Supports the active and reserve Naval Construction Force.

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[2]In NAVFAC jargon, facilities acquisition is synonymous with construction.

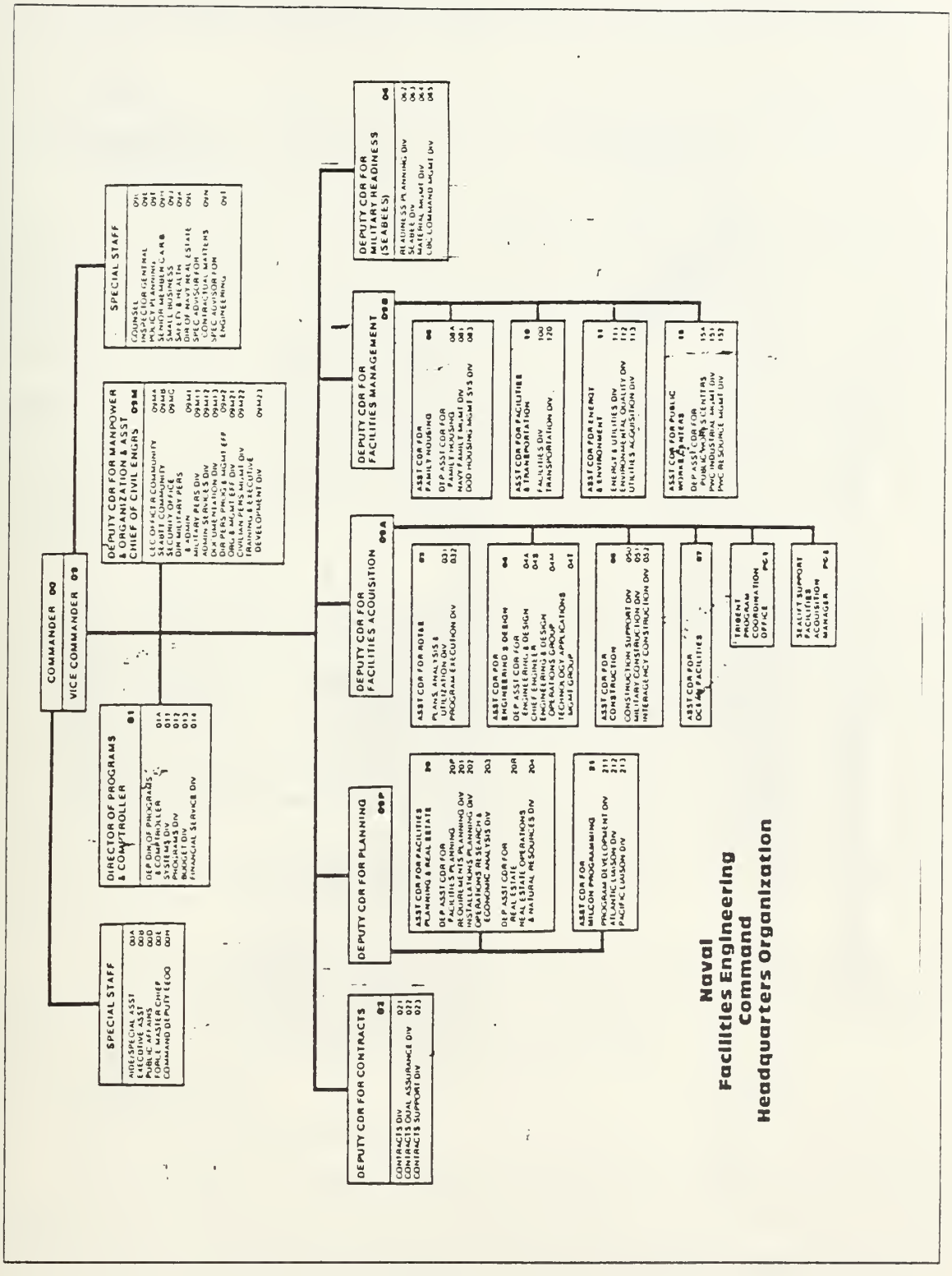

Figure 1.1 NAVFAC Organization

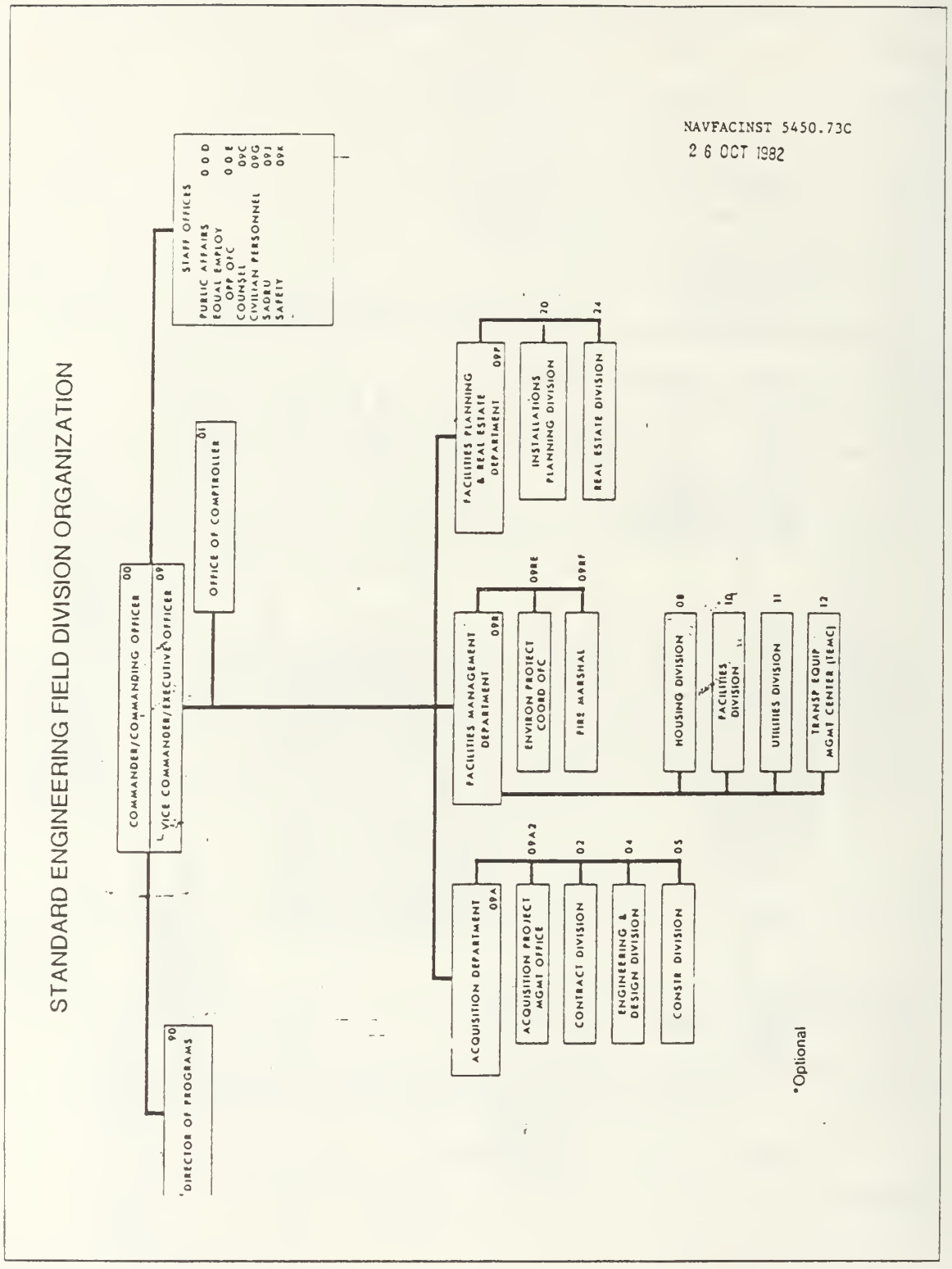

Figure 1.2 EFD Organization

- Program VIII - Family Housing. Operates and maintains family housing for the Navy.
- Program IX - Facilities Management. Oversees the total Navy public works program.
- Program X - Administration. Provides corporate direction and administrative support for the organization.

It was decided early in the research process to limit the thesis to Programs IV and IX because of the complexity of the manpower budgeting process for the other Programs, as well as the large proportion of an EFD's total staffing comprised by Programs IV and IX. In terms of organizational structure, Programs IV and IX encompass more than 80% of the manpower resources in an EFD's Acquisition Organization consisting of the Acquisition Project Management Office (Code 09A2 or 50), Contract Division (Code 02), Engineering and Design Division (Code 04), Acquisition Support Office (Code 09A1), and Construction Division (Code 05), and a smattering of resources from other Divisions (less than 5% of the resources of the previous five Divisions).

The scope of this research primarily concerns the EFDs with CONUS responsibilities. Because of the wide geographical dispersion of the activities served by the Atlantic and Pacific EFDs and the additional complexity of doing business overseas (or, in some cases, the simplicity of doing business overseas), these two EFDs are organized differently from the EFDs with only CONUS responsibilities. This is not to say that manpower staffing is any less important at Atlantic Division and Pacific Division; however, the operating parameters at these EFDs are slightly different from the others. Statistical comparisons will primarily be directed at the EFDs with CONUS responsibilities.

Lastly, this research deals only with civilian personnel requirements. The requirement for military personnel resources is addressed in an entirely different manner by NAVFAC and is beyond the scope of this thesis.

B. THE PROBLEM

How many people will we need?

For the mission of facilities acquisition the EFDs of NAVFAC have nearly doubled their primary work output of construction dollars work-in-place (WIP) from $1.7B (constant FY 82 $) in FY 76 to a projected $3.2B (constant FY 82 $) in FY 87[3] (the term work-in-place is described further in the paragraphs following). Construction

[3]Source: NAVFAC Code 05.

design technology has changed during this ten year period. Contract administration procedures have changed. NAVFAC goals have changed. The organizational structure of the EFDs has changed. In fact, just about everything an EFD does in the way of facility acquisition has changed during this ten-year period (and in the ten years before this), and significantly so.

So, how many people do NAVFAC and its EFDs need to do their job?

This thesis was born, in part, out of a desire to answer that question. Research on this topic was actually initiated from a request to explain the statistical anomaly shown in Table 1:

TABLE 1

FY 85 PROGRAM IV WORK-YEARS AND WORK-IN-PLACE DATA

EFD	Work-Years	Work-in-Place ($million)	WY/WIP
Northern Division	465	261	
Southern Division	405	284	
tot	870	545	1.60
Western Division	754	568	1.33

Source: WESTDIV Comptroller

Work-In-Place (WIP), measured in dollars, is the culmination of the facilities acquisition process--the actual construction of a facility--and is the primary output of Programs IV & IX. WIP is defined as that amount of construction work (in dollars) done by a contractor with costs subsequently billed to the Navy. For example, a contractor is building a hospital for the Navy. The contractor has bid $20 million to build the hospital and the Navy has accepted his bid. At the end of the first month (say September, the last month in the fiscal year) the contractor sends a bill to the Navy for $1 million, thus indicating he has completed $1 million worth of work, or 1/20th of the project. The Navy pays him the $1 million, thus indicating agreement that the contractor has performed that amount of work. Thus, the contractor has

performed $1 million worth of WIP, and the EFD under whose cognizance the hospital falls adds that $1 million worth of WIP to their fiscal year total.

Work-years are the total labor hours charged to a job or cost account divided by the total number of productive labor hours for a person in a year, 1741. One work-year is equivalent to one person working for one year.

Table 1 reflects that WESTDIV seemingly accomplished more WIP with less people than did NORTHDIV and SOUTHDIV combined. In fact, twenty percent more. The possible interpretations of this discrepancy are numerous. Was WESTDIV 20% more efficient than the other two EFDs? Was WESTDIV getting shortchanged in the manpower budgeting process, simply getting tasked to accomplish more work with fewer resources? And if this was the case, does NAVFAC have a viable manpower budgeting process? This table was presented to the author and the aforementioned questions posed.

C. THE GOAL

This thesis answers these questions, and more. The means by which NAVFAC projects and fulfills its acquisition mission manpower resource requirements from Congress through the POM process is investigated. Also examined and evaluated is how NAVFAC allocates manpower resources to each EFD for the budget year. Taking this process one step further, the methods by which EFDs allocate these resources internally among Acquisition Organization Divisions are assessed, and recommendations for improvements are made.

D. METHODS OF ACHIEVEMENT

At the start of this thesis, I was almost totally unfamiliar with the mission responsibilities and organizational structure of an EFD, and completely without knowledge of the manpower budgeting process. The statistics in Table 1 represented a potential problem in the allocation of manpower resources that needed to be addressed. Research involved a long course of events starting with learning what an EFD does and how it performs its responsibilities. Numerous interviews were conducted with WESTDIV personnel in the Acquisition Department and Office of the Comptroller. Statistics on staffing and work output were gathered.

Interviews were then conducted with personnel at the Navy Manpower Engineering Center, Detachment Treasure Island, and I became familiar with the Navy SHORSTAMPS (Shore Requirements, Standards, and Manpower Planning System). It

was here that I was made aware of the SHORSTAMPS staffing model used by NAVFAC.

Research was further fueled by a report prepared by personnel from Public Works Center, San Francisco, stemming from a management assist at WESTDIV. This report observed that Code 05 (Construction Division) at WESTDIV had reviewed other EFD algorithms for determining personnel requirements and had discovered that there was no consistency between EFD and NAVFAC algorithms. It further recommended that WESTDIV request that NAVFAC establish realistic WIP to work-year conversion standards and implement them at all EFDs [Ref. 5: p. 3]. This last item stemmed from a NAVFAC instruction that provides guidance for staffing Resident Officer in Charge of Construction Offices (ROICC), the field offices that administer all Navy shore facility construction contracts. The guidance is based on total WIP and number of contracts per office. The problem with the instruction is that if the EFDs staffed their ROICC offices according to the guidance they would need almost 60% more people for their ROICC offices than they already have, or had been allotted, and ROICC offices comprise nearly 30% of an EFD's total personnel.

A 1976 thesis written by LCDR D. J. Nash, CEC, USN, then a Financial Management student at NPS, recommended:

> A more realistic method of measuring output or activity is needed for for evaluating an Acquisition department's performance and resource needs at NAVFAC level. If future workload to staffing conversion factors can be developed, a more equitable allocation of resources among the Acquisition departments in various EFDs might be possible . . . .
>
> The basis of the following ideas is that a common system of conversion factors to convert future workload to required staffing should be developed to permit an improved system of allocation of resources among EFDs (at least in the Program III and Program IV areas). First, workload to staffing conversion factors could be most helpful to the CAB (Command Advisory Board) as a predictive device for the allocation of resources among the EFDs. Second, a realistic system of conversion factors could aid the EFDs in allocation of their resources among the divisions. Next, the factors could be used as a measure of comparative performance among the EFDs over a given period. Finally, and most important, these conversion factors could be used to construct the budget base for NAVFAC to be used in obtaining resources from higher authorities. This aspect may become more important with the advent of Zero Base Budgeting. [Ref. 6: pp. 116-117]

It seemed that in ten years NAVFAC had made little or no progress in the area of manpower staffing.

A questionnaire was sent to the Acquisition Department heads at each EFD requesting statistical information as well as methods by which manpower requirements

are determined. Follow-up telephone interviews were conducted with the 02, 04, and 05 Division Directors at each EFD to gain further insight into the manpower budgeting process. Additionally, the Information Systems Division at WESTDIV ran computer programs from NAVFAC's IPMS and CMS data base systems to extract special data on labor inputs and workload for the EFD Acquisition Organizations. Important conclusions were drawn from analysis of these statistics.

Manpower staffing and forecasting processes at civilian and government organizations with missions similar to NAVFAC were explored. Interviews were conducted with personnel at Bechtel Engineering International in San Francisco and the Army Corps of Engineers Monterey Field Office and District Office in Sacramento.

Funding was then obtained for a two-day trip to NAVFAC HQ in Alexandria, Virginia. In-depth interviews were conducted with personnel who make the final manpower resource allocation decisions to the EFDs and on whose written testimony Congressional action is taken regarding manpower budgeting. It was here that the strengths and weaknesses of NAVFAC's manpower budgeting system became apparent, as well as the limitations of any statistical system that could possibly be used in such a complex environment as that in which the Navy works. It is also where I began to formulate my recommendations for improvements to the current system. I was also extremely fortunate to come across brief excerpts from an Army Corps of Engineers (ACE) 1985 report on development of their own manpower forecasting system. This report led me to the ACE headquarters in Washington, DC, and there I interviewed personnel who had recently concluded development of a headquarters-level manpower forecasting system. I also received a report done under contract to the Army by the Logistics Management Institute entitled, "Forecasting Corps of Engineers Military Construction Manpower Requirements: A Prototype Model." Additionally, throughout this time numerous civilian and government publications on the subject of manpower demand forecasting were reviewed.

E. OVERVIEW OF RESEARCH RESULTS

From a slate blank of knowledge, my research has educated me tremendously. It is my assessment that the methodology that NAVFAC used in developing their SHORSTAMPS staffing standard to forecast manpower requirements for the Facilities Acquisition mission is valid. However, because this staffing model was developed using a limited data base--only FY 79 data--its accuracy is questioned given the changes that

have occurred in the means by which NAVFAC carries out its facilities acquisition mission, fluctuations in workload since the model's inception, and changes in the contracting environment. This thesis updates this model using FY 85 and FY 86 data. Although five of eight regression coefficients in this updated model were very similar in value (within 10%) to those developed by NAVFAC, three of the remaining variables had orders of magnitude differences. These differences could potentially cause NAVFAC's manpower forecast to underestimate "true" requirements, given particular changes in workload composition from those that existed in 1979. Other factors, not quantified in the SHORSTAMPS model, also influence resource allocation. This thesis makes observations on these "other" factors and recommends changes to the way some are interpreted. It also introduces additional influences to be considered when NAVFAC allocates Programs IV and IX resources to the EFDs.

The means by which EFDs internally allocate resources among Divisions is described and appraised. Although there are no published methods to be used as guidance by the EFDs, general methods tended to be similar. Some EFDs did have more formal systems than others and it is hoped that, by describing these, ideas may be spawned for improvements.

Much of manpower demand forecasting relies on statistical analysis. As much as possible, to simplify communicating the results of my research, complex calculations and analyses are avoided. Instead, the results of analyses done by other researchers are summarized, referenced, and in some cases revised with more current data. Unless warranted, no attempt was made to validate the conclusions of statistical analyses done by others and used as references in this thesis.

F. THESIS ORGANIZATION

This thesis continues with Chapter II providing background information on NAVFAC and the EFDs, the facility acquisition process, and factors that affect manpower staffing. Chapter III provides an overview of current methods of manpower demand forecasting gleaned from civilian periodicals, the Navy SHORSTAMPS program, and the Air Force Management Engineering Program. In Chapter IV the evolution of NAVFAC's acquisition mission manpower forecasting model is described and its validity evaluated. Similarly with the Army Corps of Engineers' new model, and the two models are compared. Factors not quantified by NAVFAC's model are described, and recommendations made as to their influences. Chapter IV continues by

describing information gathered and results of interviews with the EFD Program and Division Directors and assesses EFD internal resource allocation processes. Chapter V presents recommendations and conclusions.

II. BACKGROUND

The Naval Facilities Engineering Command is in a unique business: performing the acquisition, maintenance, and disposal of Naval shore (and ocean) facilities. It does have its counterparts in other areas of government: the Army Corps of Engineers and the General Services Administration; however, there are major structural differences between these organizations and NAVFAC, which preclude one organization from directly adopting another's staffing methods. However, the Army Corps of Engineers does have a Facilities Acquisition organization, and they do go through an acquisition process similar to NAVFAC, so manpower staffing methods for NAVFAC and ACE will be compared for the facilities acquisition mission. In the private sector few, if any companies, perform the same broad mission as NAVFAC. Most companies specialize in facility design, construction, project management, or, a few, in facilities management. Those companies that do perform integrated missions along the line of NAVFAC do so under different "rules." The Government operates under stringent contracting regulations, with less flexibility in recruiting staff, and Government inspection procedures and reporting requirements make comparisons of manpower staffing methods with the private sector exceedingly difficult.

In order to answer the question, "How many people do we need?", for the entire NAVFAC command structure, and for each EFD, the reader must understand the organizational structure and mission of NAVFAC and the EFDs, the facility acquisition process, the manpower acquisition process, and the numerous factors that affect manpower staffing. This chapter describes the aforementioned aspects, presents general trends in work output and staffing, and delves into the complexity of manpower budgeting for an organization as unique as NAVFAC.

It should be noted that literally volumes of literature have been written on the mission and organization of NAVFAC, and the facility acquisition process. This chapter summarizes these topics and highlights those areas that are particularly pertinent in the manpower budgeting process.

This chapter is organized such that after each major section, (1) Mission and Organization of NAVFAC, (2) EFD Organization, and (3) Facilities/Manpower Acquisition Process, influences of that section on manpower staffing are addressed.

This chapter then concludes with a summarization of these influences and introduces further factors in manpower staffing, unique to NAVFAC and each EFD, that must be taken into account when performing manpower budgeting. This chapter provides a lead-in to Chapters III and IV where the means to deal with these factors is addressed.

A. MISSION OF THE NAVAL FACILITIES ENGINEERING COMMAND

NAVFAC's mission can be grouped into four broad categories: facilities and real estate planning, acquisition of new facilities, facilities management (public works), and military readiness.[4] The following is a brief description of these missions:

Facilities Planning involves assisting shore activities in determining their facilities requirements, programming the correction of facility deficiencies, preparation of the Navy's annual military construction budget, master planning, and management of the Navy's nearly five million acres of real estate.

According to the NAVFAC P-68 Contracting Manual, **Acquisition** involves "The acquiring by contract, with appropriated funds, of supplies or services (including construction) by and for the use of the Federal Government through purchase or lease . . . Acquisition begins at the point when agency needs are established and includes the description of requirements to satisfy agency needs, solicitation and selection of sources, award of contracts, contract performance, and contract administration." [Ref. 7: p. 1.2.5] For NAVFAC, Acquisition involves providing architectural and engineering design and construction of the Navy shore facilities, as well as fixed surface and subsurface ocean structures. Acquisition not only refers to new construction, but to maintenance and repair projects as well.

As part of the Congressionally appropriated Military Construction (MILCON) program process, NAVFAC is involved in testifying before the various committees in the House and Senate as they are considering a given year's Military Construction (NAVY) bill. NAVFAC is then charged directly with accomplishing the acquisition of the various projects included in the Navy's part of that year's MILCON bill. Facilities are also acquired by using funds from sources other than MILCON which must proceed through the five-year-long Planning, Programming, and Budgeting process for approval. Projects funded from Operations and Maintenance (O&M) appropriations from Activity and Claimant annual budgets now comprise one-third of NAVFAC's construction efforts, a significant increase over just 10 years ago. NAVFAC also

[4]The sources for most of this section were interviews with NAVFAC and EFD personnel, and the NAVFAC Organization Manual.

accomplishes acquisition of facilities for other services and government agencies. This thesis addresses manpower staffing for the acquisition mission.

Facilities Management includes providing technical and managerial advice and assistance regarding:

- Facilities minor construction and major repair projects;
- Facilities fire protection engineering and fire fighting;
- Utilities management and operation;
- Management and operation of transportation and weight handling equipment;
- Programming, planning, design, construction, acquisition and disposal of family housing.

Military Readiness is primarily associated with the support of the Naval Construction Force, as well as the planning and R&D necessary to maintain the capability of providing engineering and related logistics support to the Navy's operating forces in the event of armed conflict.

As can be seen, NAVFAC truly has an integrated mission: planning for facilities, acquiring (constructing) them, and then performing facility maintenance and disposal.

One of the factors complicating the allocation of resources by NAVFAC to the EFDs is that three of the CONUS EFDs have portions of the NAVFAC mission assigned as unique taskings. These will be described later in this chapter.

1. Naval Facilities Engineering Command Field Activities

The four categories of NAVFAC's mission are executed through a field organization. The first three elements of the mission, facilities planning, acquisition, and management, are executed by six Engineering Field Divisions (EFDs), each of which is responsible for a specific geographical area. The following excerpt from NAVFAC Instruction 5450.7 briefly elaborates on the mission of the EFDs:

> To accomplish the planning, design, and construction of public works, public utilities, and special facilities . . . to acquire and dispose of real estate . . . to provide technical advice and assistance on the maintenance of facilities . . . to administer the assignment, replacement and disposal of transportation, construction, fire fighting, and weight handling equipment . . . . [Ref. 8: p. 1]

The fourth aspect of NAVFAC's mission, military readiness, is carried out by two Construction Battalion Centers, one located in Port Hueneme, California, and the other in Gulfport, Mississippi. Figure 2.1 shows the major field activities of NAVFAC.

There are six EFDs that serve the U.S. and the Atlantic and Pacific areas:

- Northern Division (NORTHDIV, or ND), located in Philadelphia, administers the northeastern region of the U.S.
- Southern Division (SOUTHDIV, or SD), located in Charleston, administers the southern region of the U.S.
- Chesapeake Division (CHESDIV, CD), located in Washington, D.C., administers the nation's capitol area.
- Western Division (WESTDIV, or WD), located in San Bruno, California, administers the western region of the U.S. and Alaska.
- Pacific Division (PACDIV), located in Pearl Harbor, administers the Pacific region of the world, including Japan, the Philippine Islands, and the Marianas Islands.
- Atlantic Division (LANTDIV), located in Norfolk, administers the Atlantic region of the world, including Europe, the Middle East, Iceland, and Africa.

Figure 2.2 depicts the EFD geographical responsibilities for the Continental United States (CONUS).

Pausing for a moment, I realize that managers at NAVFAC or an EFD may dismiss this section of the thesis as "old hat" and question the relevance of this discourse on manpower staffing. In fact, it is quite relevant. Manpower staffing must not only take into account the volume of the obvious types of work output, but also the demographics of areas served, missions unique to a particular EFD, the numbers and dispersion of activities served, the general capabilities of contractors in a geographical area, the organizational structure of an EFD, and the numerous other factors that contribute to the uniqueness of a particular EFD. If all EFDs were the "same," manpower budgeting at NAVFAC would simply be a matter of relating basic outputs to inputs. The influences of these factors will be discussed throughout this chapter.

NAVFAC facilities management is executed by Public Works Departments (PWDs) located at individual Naval shore activities, or through nine Public Works Centers (PWCs), which are located in areas where there are concentrations of Naval Activities. These PWCs are separate commands and operate like non-profit businesses. The PWDs and PWCs receive technical and management support from the EFD within whose geographical area they are located; however, CONUS PWCs fall under NAVFAC's direct chain of command, and, as such, they receive resources and workload tasking directly from NAVFAC.

To handle a high priority or specialized acquisition project of a large scale, which requires special management attention, NAVFAC establishes a separate Officer

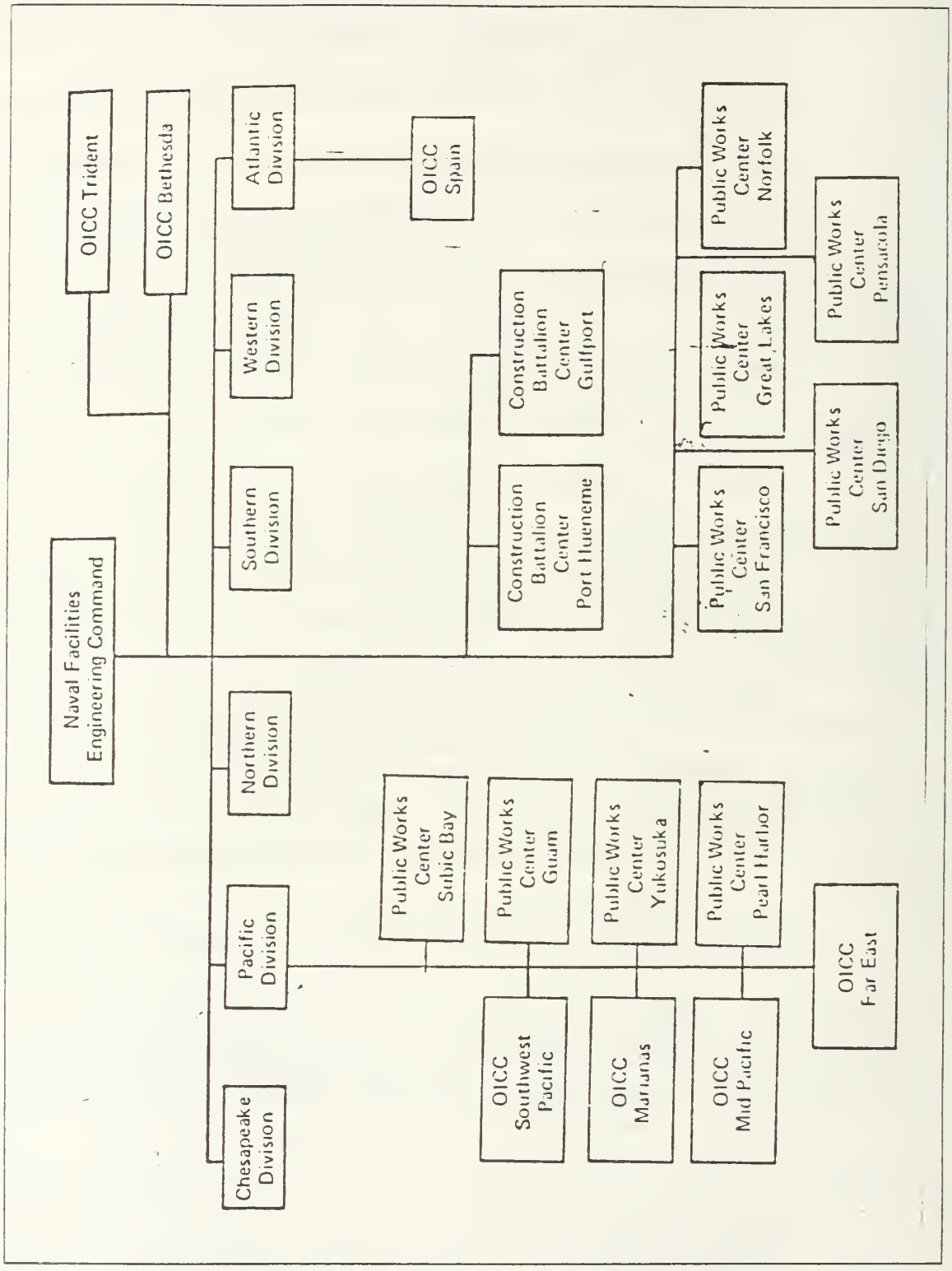

Figure 2.1 NAVFAC Field Activities

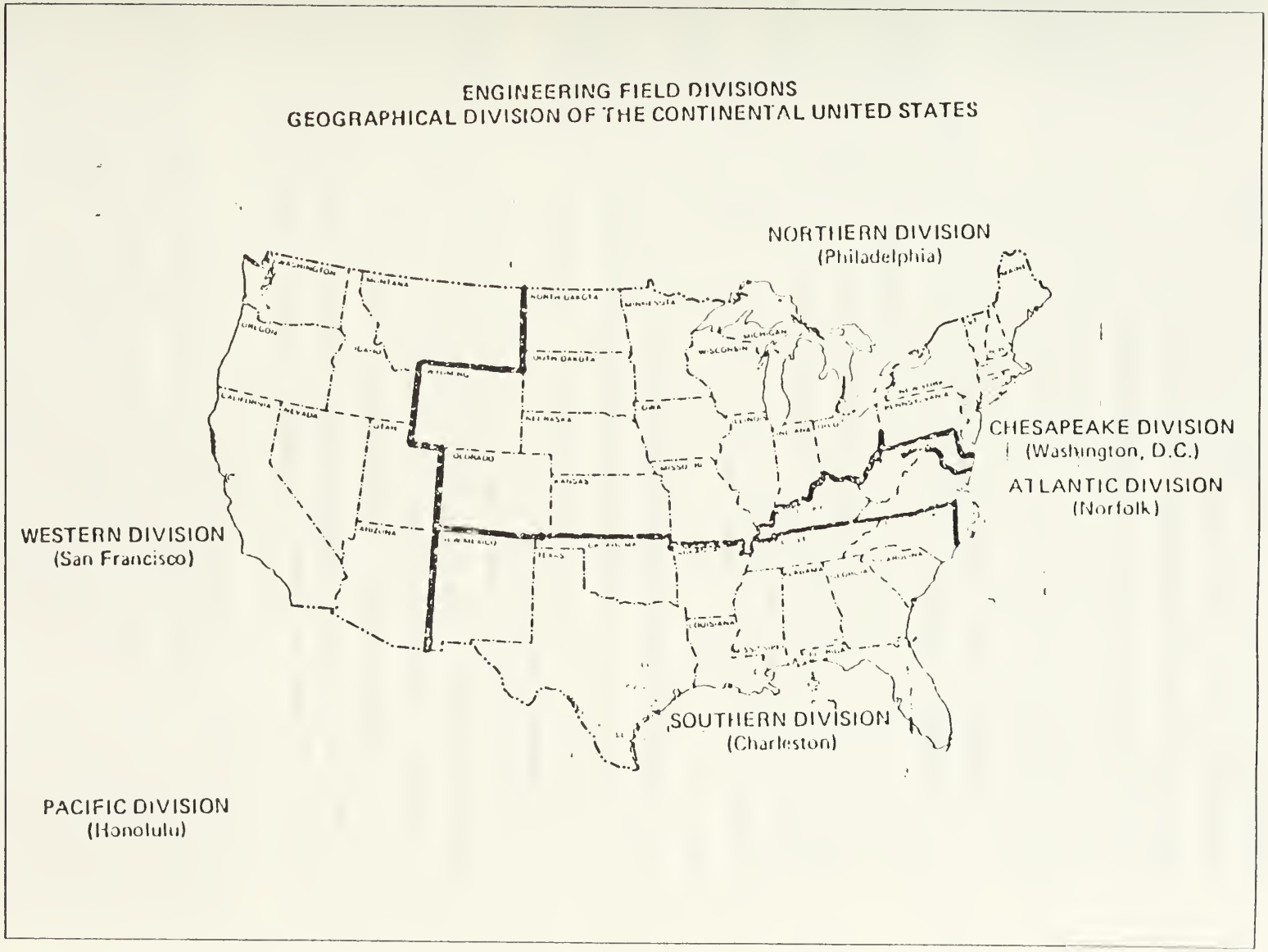

Figure 2.2 EFD Geographical Responsibilities

in Charge of Construction (OICC) organization to oversee the project on a conception-to-completion basis. These organizations report directly to NAVFAC. NAVFAC currently has four such organizations: OICC Trident, which was established to oversee the planning through construction of approximately $1 billion in facilities to support the Trident Submarine program, and three other OICC organizations which are now closing out their construction efforts. These include OICC Diego Garcia, OICC Navy Medical Command, San Diego, and OICC Travis Air Force Base.

2. NAVFAC Headquarters: Organization and Management Process

NAVFAC headquarters is organized along four broad functional mission categories, described earlier. NAVFAC headquarters organization is shown in Figure 1.1. In 1959 NAVFAC adopted the Program concept where it grouped its efforts into a series of product and service areas. This concept has been integrated into a system of Management by Objectives. Today, there are nine Programs that are used by NAVFAC to set priorities, allocate resources, and evaluate performance. Each of these Programs has a Program Manager at NAVFAC who oversees the definition of Program goals and objectives, is involved in projecting and assigning future workload, and is the primary mentor in allocating resources among NAVFAC field organizations and in appraising performance towards meeting the assigned goals and objectives.

3. Command Operating Plan

The key documents that communicate NAVFAC's goals, plans, and allocation of Program resources are the Command Operating Plan (OP-Plan) and Command Guidance (CG). Each is promulgated yearly. The CG provides overall NAVFAC direction, management policy, and general goals, and the OP-Plan provides specific goals and Program resource allocation. These resources are funding dollars and labor work-years.[5] The basis of the OP-Plan, and of NAVFAC's management policy, is the

[5]As an element of background, formerly Naval activities' people resources were limited by on-board ceiling constraints. Now a Naval activity can have as many people on board at a given time as desired. However, at the end of the fiscal year the work-years expended by that activity's personnel cannot exceed the work-year ceiling. Work-years being defined as labor hours expended divided by the total number of available work hours in a year (1775 productive hours). This form of restriction resulted in the practice of hiring large numbers of temporary personnel at the beginning of a fiscal year and then terminating their employment later in the year to meet work-year ceiling constraints. A loophole in manpower staffing that existed until October 1986 was that work-year ceilings did not constrain an activity to the grade structure of its personnel. There was virtually no consideration of the cost of labor. Work-years were allocated along with funds to pay for labor, but if additional O&M funds were available from other sources (like facility maintenance) the activity could use these additional funds to pay for a mix of higher graded GS personnel. As a result, Navy labor costs skyrocketed. SECNAV Lehman closed this loophole when he enacted the "Managing to Payroll" program. Now, activities can no longer use "spare" O&M funds to pay labor costs.

system of Management by Objectives. As stated by RADM J. P. Jones, CEC, USN, Commander NAVFAC, in OP-Plan 86: "I have directed . . . the substance of our annual goals . . . to actions which depict truly significant achievements sought during the fiscal year." [Ref. 4: p. i] For example, the following are excerpts from the FY 86 OP-Plan Program IV goals:

"Major emphasis in FY 86 will be to carry out our mission in an efficient and cost effective manner:

a) Improve NAVFAC contracting practices by conducting procurement Management Review visits . . . and establishing business clearance review section to review large negotiated contracts.

b) Improve timeliness of construction project completion and turnover . . . .

35% Design Completion--Complete all FY 87 MCON projects which have been authorized for design on a timely basis, to the 35% design stage by 30 November.

Work in Place--Achieve FY 86 Income and Non-Income bearing WIP targets as follows . . . " [Ref. 4: p. 46]

The goals cited in the OP-Plan are mandatory and field activities do not have flexibility in dealing with the goals as they do, to some extent, with the resource allocations.

The OP-Plan, being the key document driving the manpower budgeting process, is not developed in a vacuum but is really a contract negotiated between NAVFAC and its field activities. The EFDs "agree" to achieve specific goals and, in turn, NAVFAC provides resources to accomplish these goals. Of course, NAVFAC receives these resources from CNO and Congress. How these resources are obtained is addressed later in this chapter. This process (provision of resources to the EFDs) begins with a tentative allocation of resources through an iterative exchange between the Program Managers at NAVFAC, the EFDs and the Command Advisory Board (CAB), a group of senior NAVFAC managers charged with advising the Commander NAVFAC, and the field activities that will execute the OP-Plan workload. This process culminates in a Tentative Operating Plan (TOP) which is produced sometime after the mid-year budget review and sent to the field (EFD and other NAVFAC field activities) for comment and reclama. Based on this interchange the OP-Plan is then finalized by the CAB, prior to the start of the fiscal year.

a. Importance of OP-Plan Goals in Manpower Budgeting

Of interest in the manpower budgeting process is the relative importance placed on each of the OP-Plan goals by an EFD Commander. For example, if an EFD has been not been meeting its OP-Plan goals for Design-In-Place (DIP),[6] the Commander may choose to redirect manpower resources from another Program, or another Division within Program IV, to the Design Division (The Design Division, which is responsible for DIP, falls under Program IV). This may be done (and is actually done quite frequently) regardless of what any staffing equation dictates. M. J. Mullen, Executive Assistant at the U. S. Army Corps of Engineers Sacramento District Office, described the situation concisely during an interview when he said, "An EFD Commander will more than likely allocate resources among Divisions by asking himself, 'Where can I take the greatest risk?, and where can I get the best marginal return on my labor investment?'" An interesting question in the facilities acquisition process is, "What Division does provide the greatest 'marginal return' on the investment of labor?" The ultimate goal of the acquisition process is a completed facility. To answer this question, the concept of ***acquisition quality*** must be addressed, for quantity of "marginal return" is meaningless without a measure of quality. A Division can churn out an extra 10 contracts or an additional $5 million WIP with the addition of one more work-year of labor. But without an accurate measure of quality, these numbers are meaningless. The concept of quality, and the answer to the question of "marginal return," will be addressed more fully later in this chapter.

B. EFD ORGANIZATION/FUNCTIONAL STATEMENTS

This information in this section comes from interviews with personnel at each of the EFDs and NAVFAC and from reviewing EFD organization manuals.

All EFDs have a Facilities Management and a Facilities Planning Department, each of which handles their respective part of the EFD mission. Of interest in this thesis is the Acquisition Organization which is responsible for the design, construction, and related contract administration for facilities acquisition for all Navy and Marine Corps Commands, as well as Air Force and other non-Navy customers.

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[6]A note on the term Design-In-Place (DIP). Before a project ever comes under design its total construction cost is estimated using parametric procedures. DIP is measured at any point in time in the design life of a project by estimating the percent completion of design and equating that to its corresponding construction value. For example, if the estimated construction cost of a project was $100 million, and its design was 50% complete, then the value of DIP is $50 million.

The term "Acquisition Department" is purposely avoided although it is depicted in Figure 1.2; the reason is that the standard EFD organization is now being challenged under a pilot program initiated by NORTHDIV. However, the basic entities of an Acquisition Organization are similar across all EFDs.

Acquisition Project Management Office (Code 09A2 or 50) handles the project management function. This office coordinates the work efforts of the Contract, Design, and Construction Divisions and is responsible for execution of all acquisition projects from the feasibility study stage, through design to construction and transfer to sponsors/customers. A comparison of the structural organization of this Division across the EFDs revealed that 09A2 is primarily organized by function, with project managers responsible for particular functional areas such as waterfront projects, airfield projects, etc. This organization is characterized by a large minimum staffing level (compared to the entire Division) which is independent of workload in a broad minimum-to-maximum range.

Acquisition Coordination Office (Code 09A1) coordinates the overall resources program for the Acquisition Department. It is concerned with utilizing monetary allotments and personnel resources to comply with on-going requirements. At some EFDs this office is part of 09A2, while at others it is a separate office.

Contracts Division (Code 02) performs the contractual tasks required in the procurement of facilities. It is responsible for procedures and actions taken in solicitation of bids and proposals, the award of contracts, and change orders. A comparison of the structural organization of this Division across the EFDs showed that 02 is organized virtually the same at each EFD. This Division is functionally organized with branches for construction contracts, facility support contracts, architect-engineer contracts, and an administrative services branch. Because this Division is segmented to a lesser extent than the other Acquisition Organization Divisions, the staffing levels in 02 are much more responsive to absolute workload changes. Figure 2.3 depicts SOUTHDIV's Code 02 organization. The other EFD Codes 02 are similarly organized.

Design Division (Code 04) is responsible for the design, engineering, and estimation of costs of facilities to be constructed. As stated in the NAVFAC P-68: "The Design Division shall primarily be responsible for the adequacy of the plans and specifications. It shall assure that specifications are clear and unambiguous..." Most of NAVFAC's project designs are done under contract by private Architect-Engineering

(A-E) firms. The Design Division oversees this work, ensuring the design conforms with NAVFAC standards and customer requirements. Approximately 15% of MILCON design is accomplished in-house by Design Division personnel. Figure 2.4 depicts LANTDIV's Code 04. The other EFD Codes 04 are similarly organized.

Construction Division (Code 05) provides construction management and surveillance during the construction of facilities. This it accomplishes through a staff at the EFD headquarters and a field staff--the Resident Officer in Charge of Construction (ROICC) and Officer in Charge of Construction (OICC). A brief, but more detailed discussion of the Construction Division is warranted because of the size (typically 1/3 of an EFD's total staff) and responsibilities of this division. [Ref. 9]

Table 2 depicts the general distribution of personnel resources in each CONUS EFD's Acquisition Organization.

TABLE 2

DISTRIBUTION OF EFD ACQUISITION ORGANIZATION RESOURCES, FY 86

	Percentage Distribution			
EFD	05/ROICC	04	02	09A2/50/09A1
ND	56%	20%	15%	9%
CD	56	20	18	6
SD	58	24	8	10
WD	55	22	12	11

Source: NAVFAC IPMS data base

ND - Northern Division
SD - Southern Division
CD - Chesapeake Division
WD - Western Division

1. NAVFAC Contracting Authority

In order to understand how 05 executes its responsibilities, a brief overview of the authority to perform facility procurement is required. This section draws primarily on the NAVFAC P-68 Contracting Manual, as well as my experience in a ROICC office.

Responsibility for Navy procurement is vested, by statute, in the Secretary of the Navy. The Secretary has delegated this responsibility to the Navy Systems Commanders for procurement of supplies and services for their areas of cognizance. The Commander NAVFAC is designated as "Contracting Officer" for the procurement of specific facility and transportation related items. As stated in the P-68:

> Only Contracting Officers are authorized to enter into, modify and or terminate contracts. They also issue final decisions on contract disputes, chair selection and negotiation boards, and approve actions such as bid irregularity disposition, business clearances, board reports, and ensure compliance with the terms of the contract. [Ref. 7: p. 1.4.1]

2. **EFDs' Contracting Authority**

The Commander NAVFAC has redelegated to the EFD Commanders Contracting Officer authority. As stated in the P-68 Contracting Manual, this includes authority for the award and administration of the following types of procurement actions (this list is not all inclusive):

- Sealed bid contracts for new construction, repair or alteration.
- Sealed bid purchase contracts for specialized materials and equipment not available through regular supply channels.
- Sealed bid contracts for demolition and removal of buildings and structures.
- The slating, selection and negotiation of Architect-Engineer and Engineering Service contracts. [Ref. 7: p. 1.4.1]

Authority for negotiated construction contracts is delegated on a case-by-case basis.

3. **Officer in Charge of Construction**

An EFD Commander can redelegate all or part of his contracting authority to field personnel within his EFD's geographical area of responsibility. This authority is called Officer in Charge of Construction (OICC, or OIC) authority. Normally, he will delegate OICC authority to Navy Civil Engineer Corps Officers who are assigned as Public Works Officers of specific activities, primarily for the purpose of executing the design and construction of projects funded at the activity level. These are primarily Real Property Maintenance (RPM) projects or Facility Support Contracts funded from the activity's Operation and Maintenance (O&M) funds, or "Special" projects funded by Major Claimant O&M funds.[7] Facility Support Contracts are NAVFAC contracts

[7]O&M funded projects do not receive Congressional approval by individual project as do MILCON projects, and thus avoid the five-year long Planning, Programming, and Budgeting process through which MILCON projects pass to receive

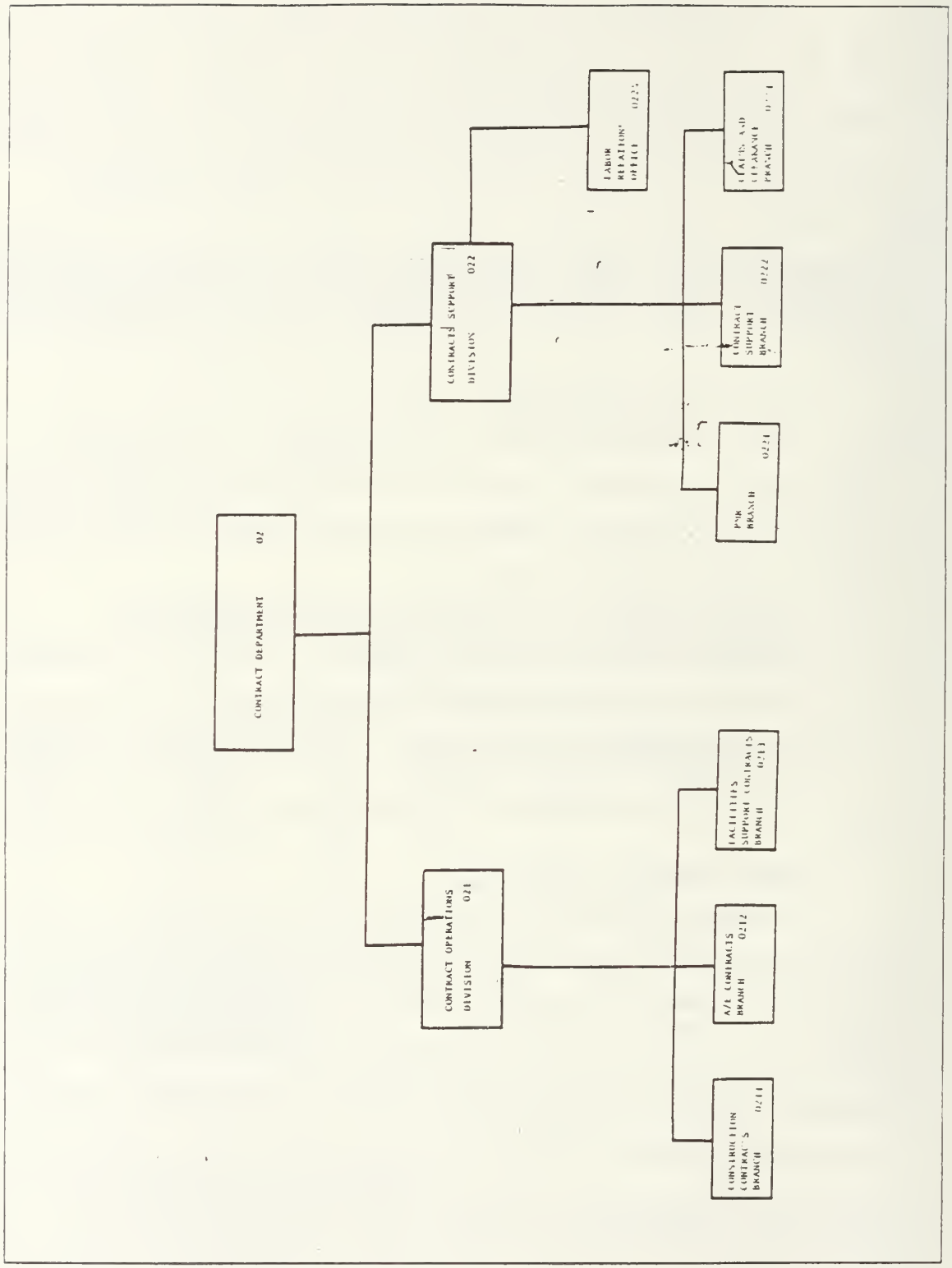

Figure 2.3 Code 02--SOUTHDIV

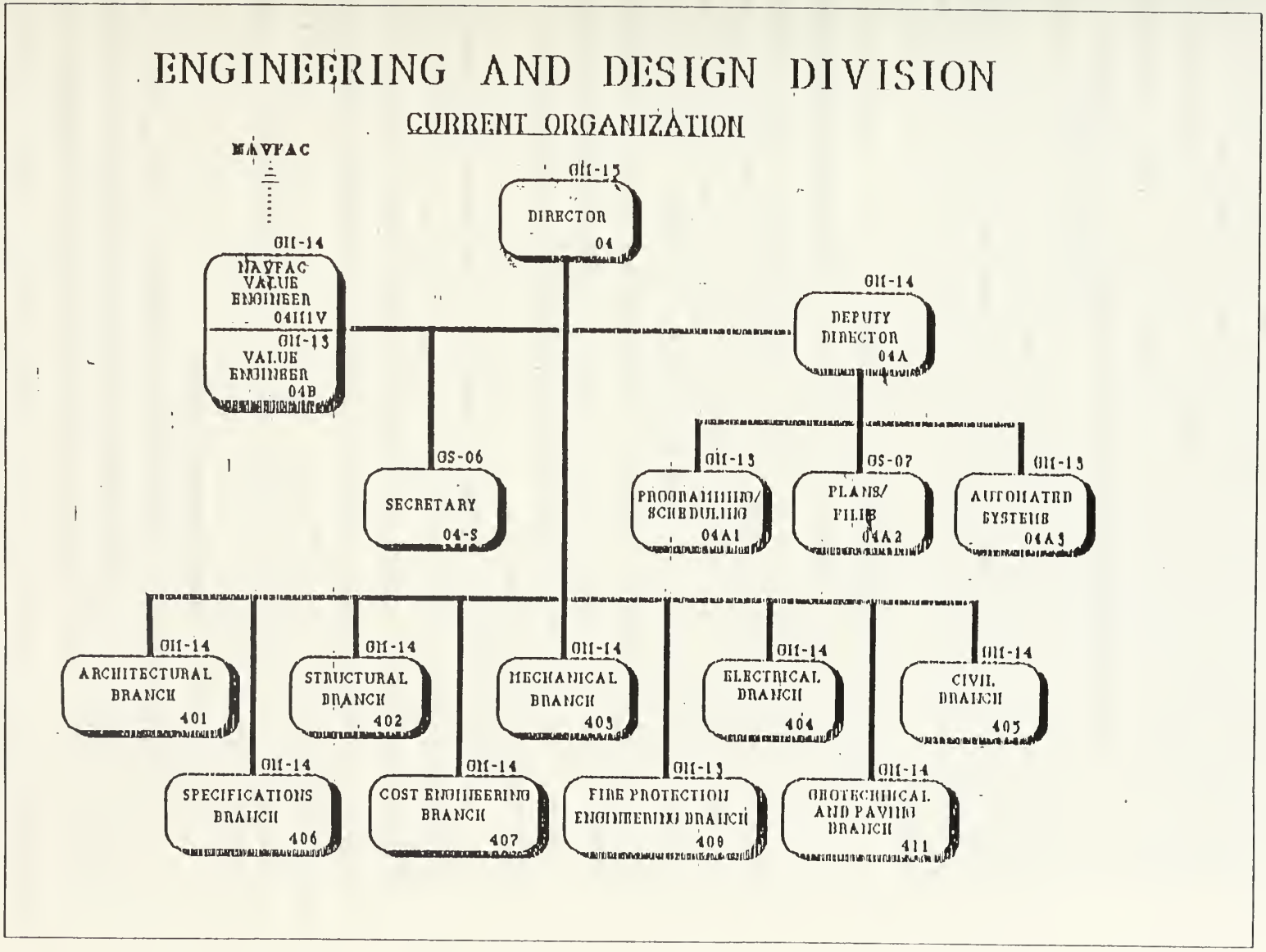

Figure 2.4 Code 04--LANTDIV

for public works services such as janitorial services, security services, groundskeeping, utilities maintenance, etc. These contracts now consist of more than 15% of the EFD's WIP efforts (dollar value of Facility Support Contracts are considered WIP), nearly triple the amount of just seven years ago.[8] This growth is largely the result of the Commercial Activities Program, described in Chapter III. This OICC authority covers the entire spectrum of the facilities procurement process: preparation of the plans and specifications for a project, advertising and awarding a construction contract, and the administration of these contracts. This authority is specified in the same language as it is delegated to the EFD, except that dollar limits are imposed for each contract category.

4. **Resident Officer in Charge of Construction**

The construction contracts for virtually all MILCON projects administered by the four CONUS EFDs are administered through ROICC offices. Additionally, ROICC offices also administer the majority of O&M funded RPM, Facility Support Contracts and "Special" projects. The ROICC office is a field unit of the EFD and has the job of administering construction contracts that an EFD or OICC has awarded. The majority of ROICC offices are co-located with the major Public Works Department or Public Works Center, in a particular area. Most ROICC offices also have OICC authority, and thus a self-contained contracting staff (02 types) may also reside within a ROICC Office.

A note on the term "contract administration:" As defined in the P-68, contract administration is the "process of making payments and assuring that a contractor provides that which is required under a contract which includes monitoring contractor progress, performing quality assurance, and providing or obtaining technical reviews and approvals." [Ref. 7: p. 1.2.8]

Figure 2.5 depicts SOUTHDIV's ROICC organization, which is similar in structure to the other EFDs.

5. **Construction Division Headquarters Staff**

The 05 headquarters staff provides administrative and overhead support to the OICC/ROICC field offices. Their responsibilites include providing construction policy guidance, developing staffing structures, participating in labor management meetings

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approval funding appropriation. However, costs of "new construction" O&M funded projects cannot exceed $200,000.

[8]Source: FACSO reports on EFD WIP.

and negotiations, and administering the construction safety program [Ref. 9: p. 34]. Thesis research included interviewing the 05 Division Directors to find out what staffing methods they used for their field offices. Some were quite innovative and will be described later. In fact, one method could usefully be adapted by other EFD Divisions.

6. Differences in CONUS and OCONUS EFD Organizations for Facilities Acquisition

Earlier it was stated that the scope of this research primarily concerns the EFDs with CONUS responsibilities. Because of the wide geographical dispersion of the activities served by LANTDIV and PACDIV and the differences in doing business overseas, these two EFDs are organized differently than the EFDs with only CONUS responsibilities. PACDIV accomplishes its facilities acquisition responsibilities through five OICC organizations, and LANTDIV carries out all of its acquisition responsibilities in Europe through one OICC. These OICCs carry out the project management, design and construction administration functions for each of the Naval activities within their respective geographical areas, while the EFDs with CONUS responsibilities do most of the design and project management at the EFD. Construction contract administration is performed at various ROICC offices located at or near the construction site.

7. Differences in EFD Acquisition Organizations

Returning now to the discussion on Acquisition organizations, the "typical" EFD Acquisition Department is now undergoing significant changes, initiated by NORTHDIV. In a pilot program, begun in 1985, NORTHDIV changed its organizational structure, moving the Design and Project Management Divisions from the Facilities Acquisition Department (09A) to a newly created Facilities Engineering Department (09X). Figure I.2 depicts a "typical" EFD and 09A organization. Figures 2.6 and 2.7 present NORTHDIV's EFD pilot organization and their 09X Department. In addition to this structural realignment, there was a functional realignment among Divisions. For example, WESTDIV's Design Division (Code 04) is responsible for the administration of Architect-Engineer contracts, a substantial effort. Under NORTHDIV's functional realignment, this responsibility has shifted to the 05 staff at EFD headquarters. In fact, at each EFD interviewed, certain administrative efforts varied from Division to Division. Thus, the 05 Division at SOUTHDIV did not entirely have the same responsibilities as the 05 at WESTDIV or at CHESDIV.

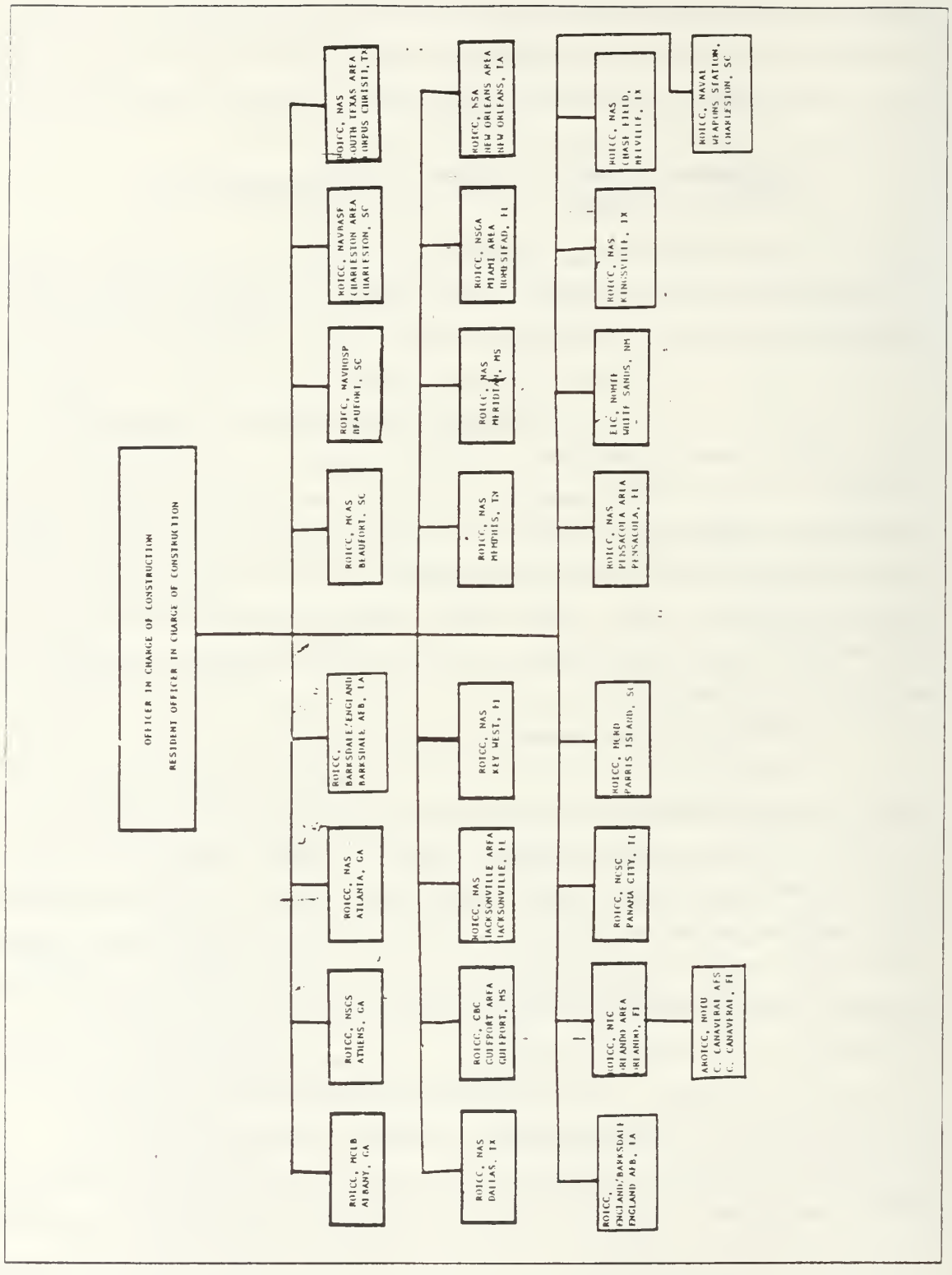

Figure 2.5 ROICC Organization--SOUTHDIV

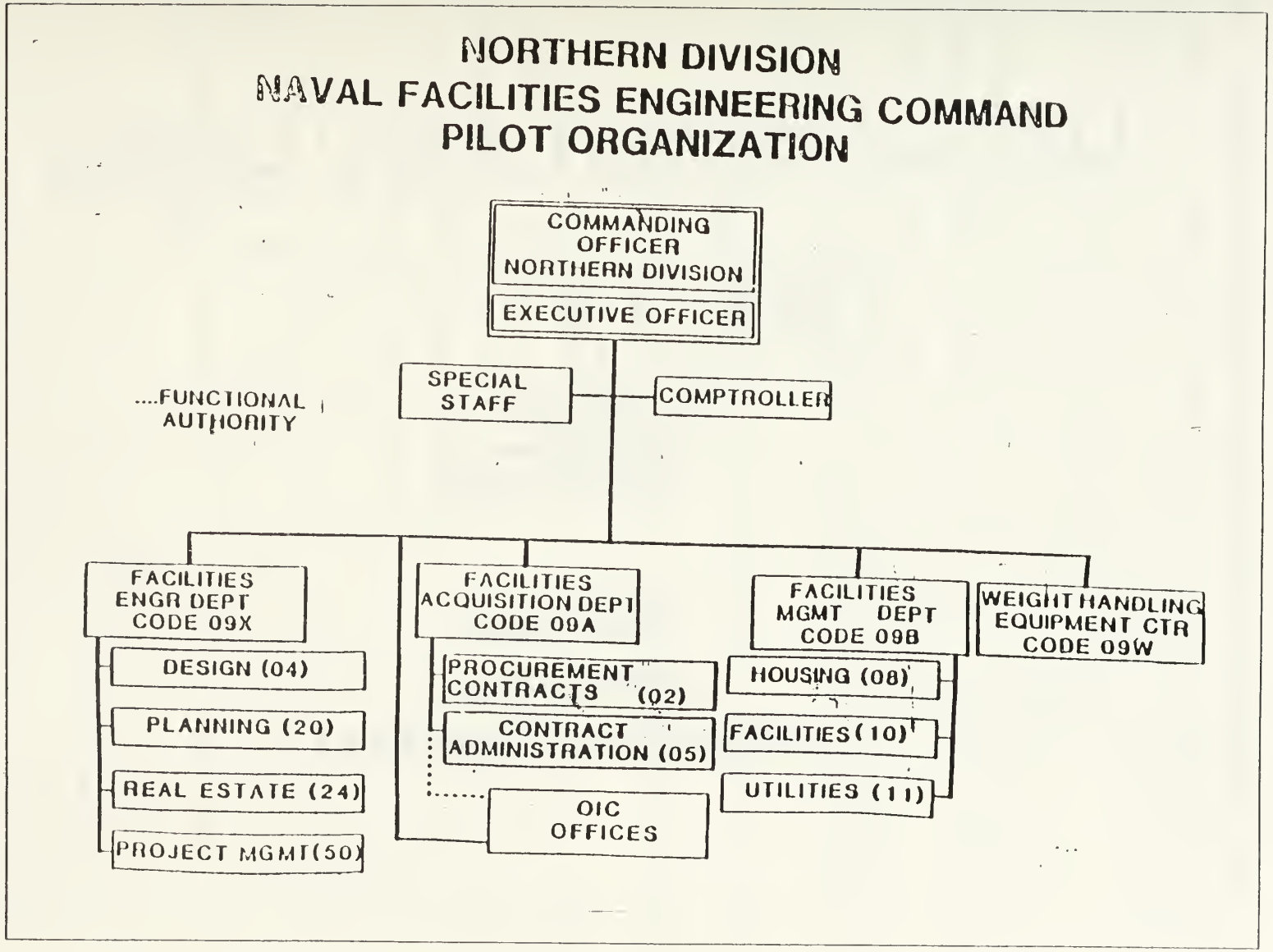

Figure 2.6 NORTHDIV Pilot Organization

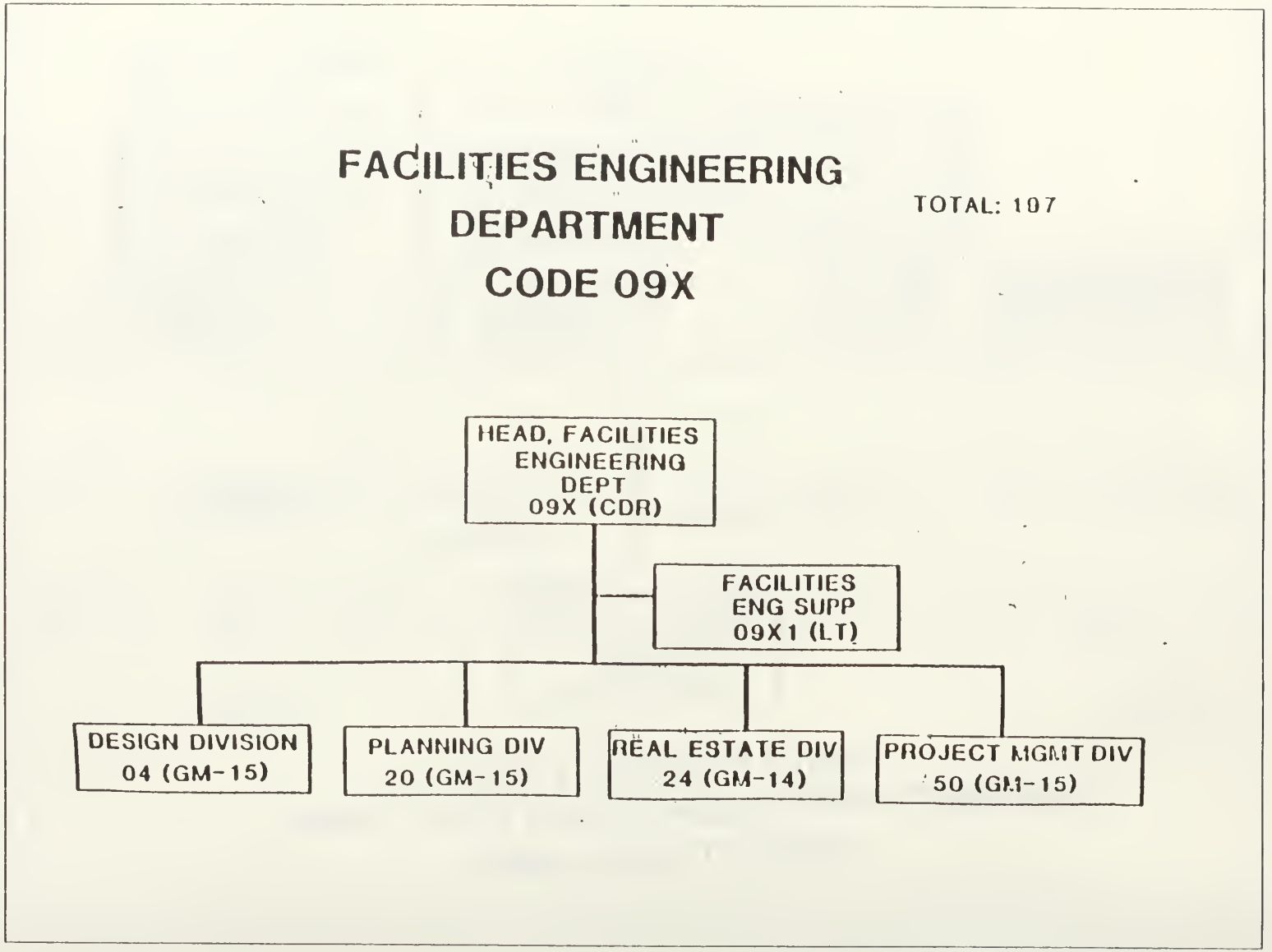

Figure 2.7 NORTHDIV's Facilities Engineering Department

Also, there are differences in the way each Division accounts for people. For example, at the ROICC offices some EFDs count the personnel who perform contracts administration tasks (preparation and award of contracts) as part of the 02 Division while others count these personnel as part of the 05 Division.

8. **Complexities of "Universal" Divisional Budgeting Methods**

While the overall missions of the EFDs are similar, and NAVFAC has promulgated a "typical" EFD organization structure, in fact, significant differences in structure and Division responsibilities exist from EFD to EFD, as shown. This complicates the manpower budgeting process in several ways:

- It frustrates the development of a universal manpower budgeting system for similar Divisions of the EFDs. For example, the specific taskings of the Contracts Division at WESTDIV differ from those at NORTHDIV. Thus, any universal process would need to take these differences into account, and would be hard pressed to do so.
- Direct comparison of productivity by EFD Division would not be ***entirely*** accurate, thus hindering the management evaluation process, and any direct comparisons between Divisions.
- The case for budgeting by segmentation, or for NAVFAC to allocate resources by Division at an EFD, is diminished. NAVFAC simply does not have the management resources to make such micro-level decisions.

9. **Program Concept Facilitates Manpower Budgeting**

Nonetheless, because the overall missions of the EFDs are similar, comparisons can be made EFD to EFD and a "universal" budgeting process for the EFDs is possible. That NAVFAC executes its responsibilities through a Program concept, facilitates the assignment of EFD goals and the allocation of resources. Thus, regardless of differences in Division responsibilities from EFD to EFD, the Program IV and IX goals are carried out through the integrated efforts of the entire acquisition organization. This thesis addresses the resources used for Program IV and the Facilities Support Contracts aspect of Program IX. These two Programs (IV&IX) include all of the personnel in the 05, 02, 09A1, and Project Management Divisions (09A2 or 50 depending on the EFD), and approximately 75% of the work-years consumed by the 04 Division.

The EFD Programs IX and IV workload are somewhat unique among Programs in that they are less of a ***negotiated*** tasking and more of an ***assigned*** tasking. The primary efforts of these Programs are WIP, and this WIP is primarily Military Construction (MILCON) and O&M work. MILCON is defined as "new" construction projects above a $200,000 threshold that receive approval and funding appropriation on an individual basis from Congress. The MILCON acquisition process is described in greater detail in the next section.

As MILCON is determined primarily by yearly Congressional appropriations, to a large degree it is independent of EFD influences. Similarly with O&M funded projects, which are determined by individual Naval shore activities. As will be explained in the next section, the manner by which the workload of Programs IV and IX is assigned to an EFD significantly impacts the manpower budgeting process. Of course, prior to construction work's actually proceeding on a project, design must be completed and a contract for construction awarded, both of which are governed by EFD efforts. Delays in design or contract award affect the timing of both construction efforts and resource requirements. Thus, an EFD can come under considerable pressure by "customers" to expedite the design and award of contracts. The requirement to have the right numbers of people to do the job becomes evident.

C. THE FACILITIES ACQUISITION PROCESS/MANPOWER BUDGETING PROCESS

With a background in the mission and organization of NAVFAC in hand, this next section will provide an overview of the facilities acquisition process and manpower budgeting process as it pertains to the Programs IV&IX functions at NAVFAC. This section is divided into three subsections. The first begins with the process for Military Construction (MILCON), which comprises approximately 40% of the EFDs' WIP. Also addressed are O&M funded RPM and Facility Support Contracts which are taking an increasing share of the EFDs' work efforts and are significantly impacting the manpower budgeting process. The second subsection provides an overview of the manpower budgeting and acquisition process for the Navy and NAVFAC. The final subsection addresses the effects of the facilities acquisition process on manpower budgeting.

1. Facilities Acquisition

a. Background

The acquisition of MILCON funded facilities follows DoD's Planning, Programming, and Budgeting System (PPBS). PPBS is simply a decision making process for allocating defense resources. It is a continuous process running in two-year cycles. It involves four major players at the Washington, D.C., level: Office of Management and Budget (OMB), Office of the Secretary of Defense (OSD), Joint Chiefs of Staff (JCS), and the Services. Through an iterative process the "players" move from broad planning considerations, to more definitive program objectives, to finally specific budget estimates which price-out the programs. The Planning, Programming,

and Budgeting System can be summarized in a few words: Based on the anticipated *Threat*, a *Strategy* is developed. Requirements of the strategy are then estimated and *Programs* are developed to package and execute the strategy. Finally, the costs of approved programs are ***Budgeted.*** Figure 2.8 depicts the overall PPBS process. [Ref. 10: p. A-9]

b. Planning for MILCON Projects

The planning for shore facilities acquisition occurs under the Navy's Shore Facilities Planning System (SFPS). This is a process that determines which facilities are needed to perform assigned missions, which facilities are in place and their condition, how well existing facilities are used, and what has been done to achieve efficient facilities utilization. Shore Facilities Planning consists of the following steps:

1. Assignment of missions and tasks by OPNAV to each activity of the Shore Establishment.
2. Determination of base loading. The Shore Base Loading Report, an extract from the Five Year Defense Plan, projects the assignment of men, ships, and aircraft to activities through the next five years.
3. Development of the Basic Facilities Requirements to support the assigned mission and loading, using planning criteria published by NAVFAC.
4. Comparison of approved requirements and existing assets at the activity.
5. Determination of excesses and deficiencies. Excesses are evaluated for possible conversion or disposal, and deficiencies are evaluated to determine how they may best be satisfied.
6. Submission of construction projects. For those deficiencies which must be met by construction, construction projects are developed and submitted through the major claimants to NAVFAC where they are entered in the MILCON Requirements List, a data base of all pending MILCON projects. [Ref. 11: p. 3]

The Navy can only build those projects for which Congress authorizes and appropriates funds. Congress passes separate military construction legislation each year to authorize construction projects and appropriate the necessary funds. The House and Senate Armed Services Committees, which have jurisdiction over authorization, and the Appropriation Committees, which provide Military Construction funds, have each established subcommittees to handle Military Construction matters. These four subcommittees all take an active interest in construction and review the annual program in great detail--individual construction projects which may be as small as $200,000.

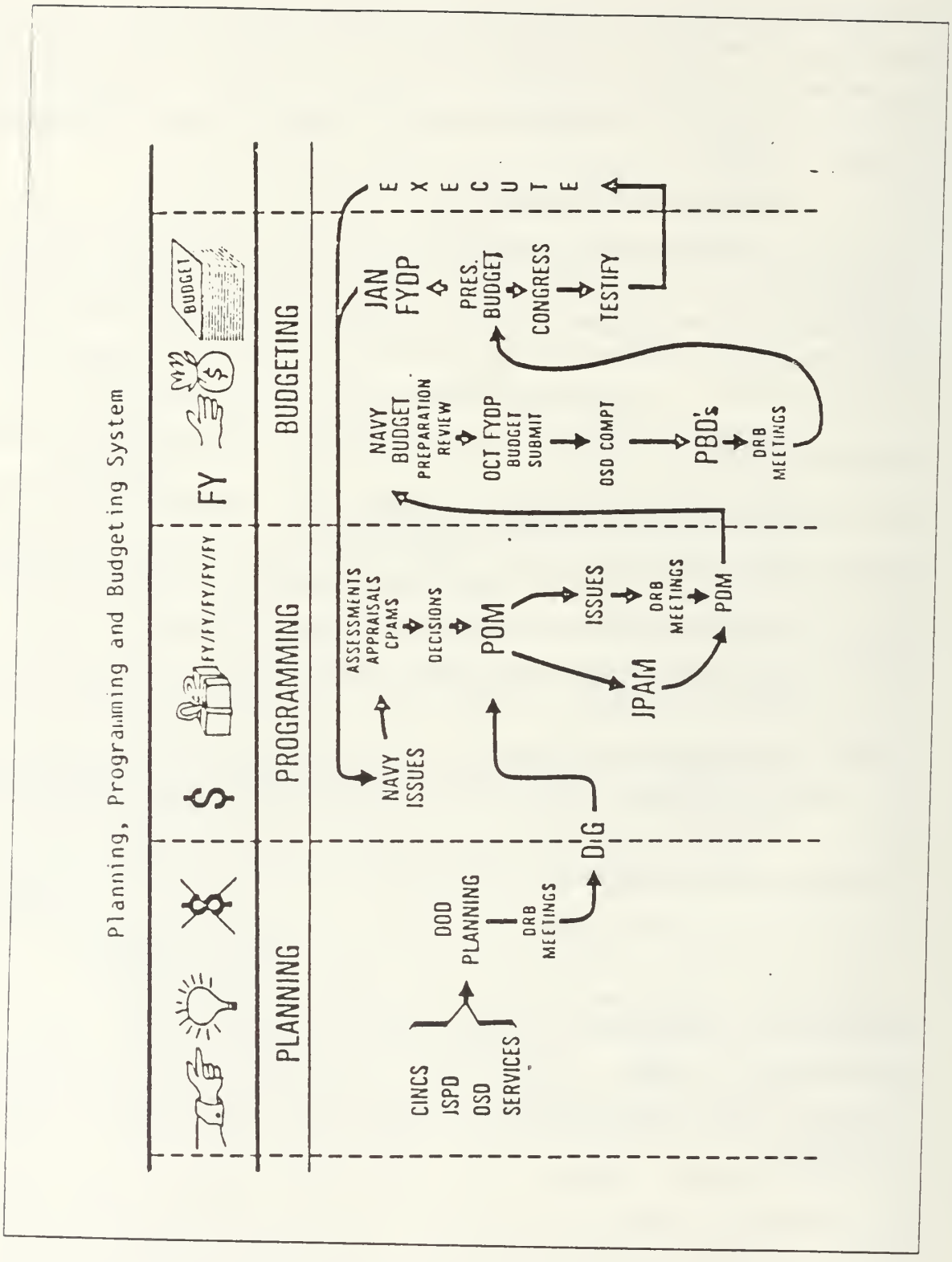

Figure 2.8 PPBS Process

c. Programming Phase

(1) *Background.* Most MILCON projects are not developed in isolation but are in response to "Fleet" requirements. The acquisition of new aircraft or ships and the Strategic Homeporting program are examples where a mission change or the addition of a new weapons system require new facilities to support these initiatives. As the "Fleet" goes, so does the facility acquisition program. A background is thus needed in how the Navy's response to the ***Threat*** is translated into budget line items. The Programming Phase provides this bridge.

Programming has been referred to as the art of equitably distributing resources within fiscal constraints. The basic purpose of the programming phase in PPBS is to translate the strategy into program force structures in terms of resource requirements including personnel, monies, facilities, and weapons systems. This is accomplished by systematic approval procedures that "cost out" force objectives for financial and manpower resources five years into the future. [Ref. 10: p. A-10]

The programming phase of the DoD PPBS cycle commences with the promulgation of the Defense Guidance by the Secretary of Defense. This document provides guidelines that must be observed by the JCS, the Military Departments, and Defense Agencies, in the formulation of force structures and Five Year Defense Program (FYDP). [Ref. 10: p. A-10]

The Five Year Defense Program (FYDP) is the official summary of programs approved by the Secretary of Defense. The FYDP specifies force levels in terms of major mission programs. The FYDP serves as the controlling internal working mechanism of the DoD PPB system. [Ref. 10: p. A-10]

The critical document during the Programming Phase is the Program Objectives Memorandum (POM). POM's are prepared by each of the Services in response to the Defense Guidance from SECDEF. The purpose of a POM is to express total program requirements in terms of force structure, manpower, facilities, materials and costs, to satisfy all assigned functions and responsibilities during the period of the Five Year Defense Program. The POM is developed by fiscal year and concentrates on the fiscal year that is two years in advance of the current fiscal year. [Ref. 12: p. 3-3]

About thirty days after the Services publish their Program Objective Memoranda, the JCS issue the Joint Program Assessment Memorandum (JPAM). The JPAM gives the views of the Joint Chiefs on the adequacy of the composite force and resource levels presented in the Service POMs. The SECDEF considers the Joint

Chief's analyses when deciding program issues, and his review of the Service POMs culminates in the drafting of Program Decision Memorandum (PDM). These decisions include intended adjustments in the POM submissions. Reclamas to these decisions may be submitted by the military departments; then final Program Decisions are issued. [Ref. 10: p. A-11]

(2) *MILCON Programming.* MILCON programming is essentially the evaluation of competing requirements Navy-wide to determine the resources that can be devoted to construction programs, and the evaluation of competing construction projects to select those to be accomplished within the resources available for a given program year. [Ref. 11: p. 7]

The FY 86 Military Construction Program was approved by Congress at $1.7 billion, a slight increase over the FY 85 program that was approved at $1.6 billion. The FY 87 program submitted to Congress was for $1.8 billion. The FY 88-91 programs range from $2.2 to $2.9 billion. Major items in the FY 87 budget included $198 million for the Trident program and $157 million for strategic homeporting. [Ref. 11: p. 8]

It should be emphasized that facility requirements, and the selection of a program year's MILCON projects, are determined by the "Fleet" and the entire Navy Shore Establishment, not by NAVFAC. NAVFAC acts purely in an advisory capacity during this process. For example, when the acquisition of the F/A-18 aircraft was entered into the POM, the aircraft was not a "stand-alone" package. Among other support requirements, the Navy also included in the POM facilities to house and repair the aircraft. NAVFAC entered into the picture by advising NAVAIR, the Resource Sponsor responsible for the F/A-18 program, what facilities were needed to support the aircraft.

Each year programming the correction of the Navy's facility deficiencies involves the selection of about 400 projects, only about five percent of the projects listed in the MILCON requirements list. These projects receive authorization to be designed by the EFDs to what is called the "35% completion" stage. [Ref. 11: p. 9]

d. Budgeting

Budgeting is the final phase in the PPB cycle. The annual budget expresses the financial requirements necessary to support approved programs that were developed during the preceding phases of planning and programming. It is through the

budget that planning and programming are translated into annual funding requirements.

Normally, the annual Budget Submission to the Secretary of Defense is made on 15 September, twelve months prior to the applicable fiscal year. The Navy Comptroller issues the call for the submission of Budget Estimates in early June of each year prior to the budget submission to SECDEF. [Ref. 10: p. A-12]

On completion of the 35% MILCON design, this information along with more accurate cost data, is further reviewed at the CNO and NAVCOMPT levels. On completion of this review, the total program year's construction projects are submitted for formal review by the Office of the Secretary of Defense as part of the Navy's budget package. SECDEF then holds a series of budget hearings jointly with OMB on the DoD component requests. These hearings are used by SECDEF to formulate his Program Budget Decisions (PBD's), which are simply further adjustments to the Services' budgets (Programs may be cut, previously deleted ones reinstated, or existing Programs expanded). The surviving projects for each of the three services are consolidated into a unified DoD MILCON Authorization Bill and submitted to OMB for incorporation into the President's budget, which the President will submit to Congress in January preceding the fiscal year covered by the proposed budget. [Ref. 10: p. A-13]

Meanwhile NAVFAC has proceeded with 100% design of the Navy's projects. The Navy also acts as the design agent for the Marine Corps and certain Air Force and NATO projects. The final review by Congress may further eliminate projects from that year's program, or new projects may be added. Thus NAVFAC may have completed the design of a project and begun staffing particular ROICC offices, only to have construction authorization delayed until next year, or the project may never receive Congressional approval. Figure 2.9 depicts a time-line of this process.

Once funds are appropriated for construction of a MILCON project, and design is complete, the Contracts Division advertises and awards a construction contract. Once awarded the contract is turned over to the ROICC responsible for the area in which construction takes place. It is then the responsibility of the ROICC Office to administer the contract until completion. The responsibility of the other Acquisition Organization Divisions, however, does not end at this point. The Contracts Division may be called upon to provide advice on any contract modifications or, if a proposed modification (change order) exceeds the funding authority of the ROICC,

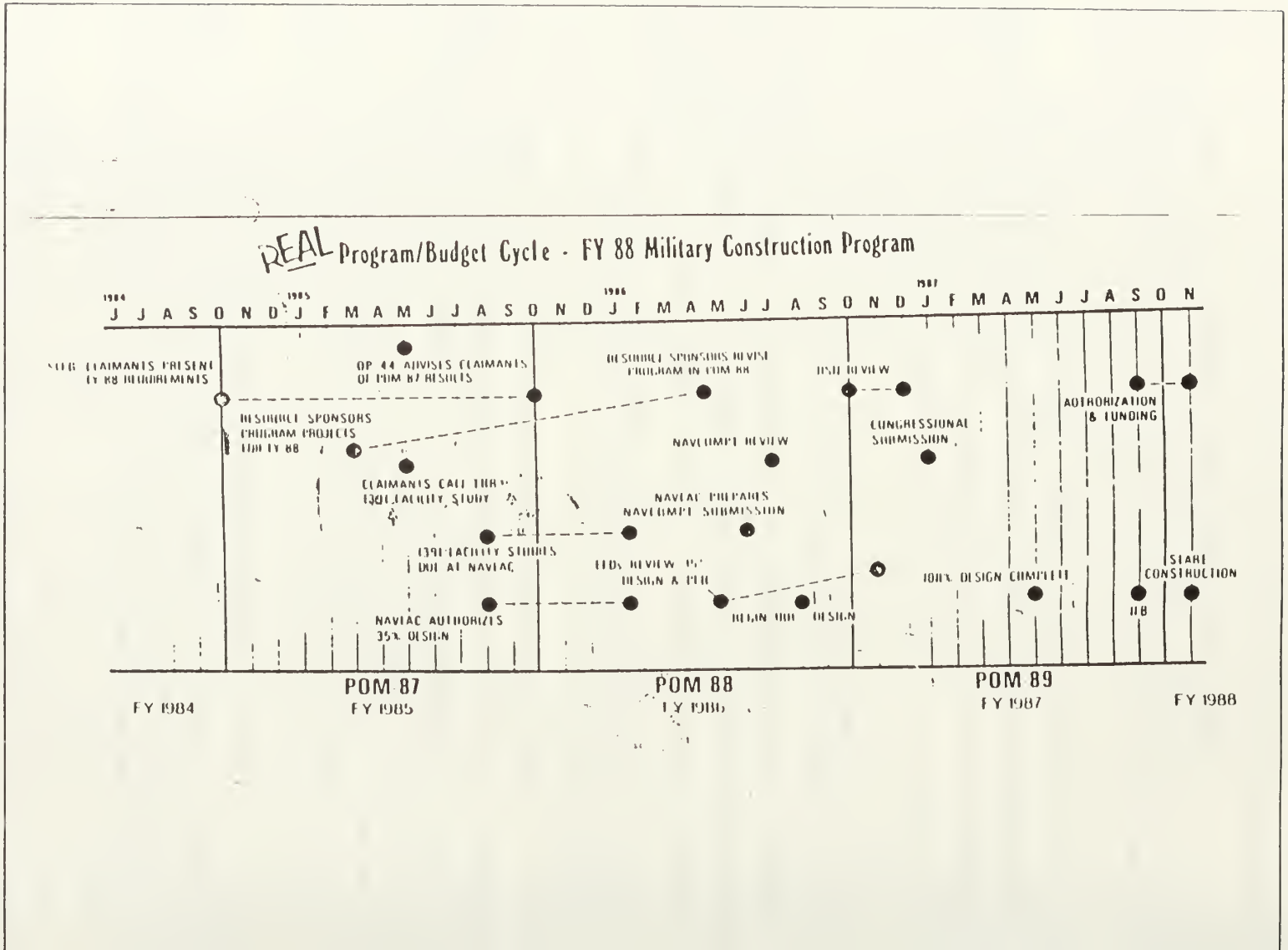

Figure 2.9 MILCON Process

this Division will have to conduct a Business Clearance and negotiate the modification--a very time consuming process. The Design Division may be called upon to provide engineering advice or to perform design and cost estimation for a change order. The total of these efforts influences the need for manpower staffing, yet may not be reflected in standard workload statistics. Interviews of Contracts Division personnel indicated that providing consultation and advice to ROICC Offices, much of which required time-consuming research effort, was a "significant" part of their daily efforts. However, no statistics are maintained on number of consultations, etc.

e. Operations and Maintenance Funded Projects

Activity Commanding Officers have authority, using their station O&M funds, to perform minor construction and alteration projects not to exceed $25,000, and repair projects not to exceed $75,000. Through a Special Project submission process activities can receive up to $200,000 in O&M funds from their Major Claimant to perform minor construction and alteration projects. There is no dollar limitation to Major Claimant O&M funded repair projects [Ref. 13: p. 32]. There is, of course, course, strict guidance on what constitutes a construction project and what is a repair project. O&M funded projects do not receive the same Congressional scrutiny as do MILCON projects and do not have to individually go through the five year PPB process to receive funding. Special Projects submitted by activities are reviewed by Major Claimants annually and must compete for limited O&M funds on the basis of priority and urgency. Needless to say, only a small percentage of Special Projects submitted by activities are funded. Design and construction contracts for these projects are awarded by local OICCs and administered by local ROICC offices. EFDs only get involved in O&M projects that exceed the contracting authority of the local OICC.

2. **Manpower Acquisition Process**

Navy manpower requirements are included as part of the PPB process. Manpower requirements are first introduced into the system during development of the POM and then follow through the PPB process as with the acquisition of any other resource. As mentioned earlier, NAVFAC is not the "prime mover" in the facilities programming process. It simply acts in an advisory capacity to the "Fleet" in the programming of MILCON projects. However, NAVFAC is responsible for facilities acquisition once MILCON projects are programmed, and thus it must determine its personnel requirements to carry out this mission. As such, during the POM process, NAVFAC is responsible to the Deputy Chief of Naval Operations (Manpower,

TABLE 18

PERCENTAGE WIP BY FUND SOURCE BY EFD

	Engineering Field Division							
	ND		CD		SD		WD	
	Fiscal Year							
Fund Source	85	86	85	86	85	86	85	86
RPM	18	15.6	15.5	16.9	23.3	29.8	19	19.4
NIF	16.4	19	13.8	13	3.5	2.8	6	5.5
FH	8.1	4.8	7.0	1.9	2.7	1.7	14	11.8
ODC	6.2	9.1	1.0	12.9	4.2	2.8	2	3.5
RIM	4.5	4.5	7.8	4.2	1.0	2.3	9	3.1
MILCON	32	31	40.8	30.9	50.0	44.8	38	45.5
FAC 0%	7.0	5.6	7.8	8.7	12.6	11.4	7	5.9
FAC 3%	7.4	10	6.6	9.9	2.4	4.1	6	4.9

Source: CMS
Note: There may be some rounding error

higher personnel turnover rate than SOUTHDIV or NORTHDIV, requires more personnel per WIP than any other EFD, and these may well be the explaining factors. The question then arises as to why WESTDIV is *able* to accomplish more WIP per labor hour, or is *required* to accomplish more WIP per labor hour. This is, essentially, the same question that prompted this thesis and was depicted, in a slightly different form, in Table 1. Now, however, it is seen that the anomaly depicted in Table 1 is, in reality, not nearly as pronounced. In fact, using NAVFAC weighted WIP factors, NORTHDIV and SOUTHDIV for FY 85,86 had a combined work-year-to-weighted WIP ratio of 4.05 while WESTDIV's was 3.82. Using updated weighted WIP factors, this ratio was 2.22 for NORTHDIV and SOUTHDIV and 2.08 for WESTDIV. Thus, the 20% differential depicted in Table 1 is, more realistically, a 6% difference. However, given the strong influences on WESTDIV of such factors as high personnel turnover rate, dispersion of offices, potential diseconomy of scale, and demographics of

TABLE 19

REDISTRIBUTED LABOR HOURS BASED ON NEW STAFFING EQUATION

	Engineering Field Division			
	ND	CD	SD	WD
	Labor Hours (000)			
Actual	1,376.7	853.4	1,416.2	2,664.4
Redist.	1,260	858	1,545	2,640
	WIP-to-Labor Hour Ratios ($/hr)			
WTD WIP per Labor Hour (actual)	231.8	228.2	285.2	277
WTD WIP per Labor Hour (redist)	251.8	226.7	261.5	279.5

areas served, this six percent differential in relative staffing level in "favor" of WESTDIV should possibly be reversed.

The summary of this subsection is that NAVFAC's SHORSTAMPS staffing-standard equation in not nearly as accurate as a stand-alone method of allocating resources among EFDs as it is in determining NAVFAC-wide requirments. The percentage of WIP by fund source varies from EFD to EFD and this influences EFD staffing requirements. Updating the weighted WIP factors is probably more important for allocating resources among EFDs than for determining NAVFAC's requirements as a whole.

2. **Influences of "Complexities" on EFD Staffing**

The previous subsection briefly discussed the factors other than workload that have the greatest effect on EFD staffing. Several of these factors may explain why CHESDIV has a lower WIP/WY ratio than any other EFD and why SOUTHDIV has the highest. Of those primary influences identified during the ACE workshop, CONUS/OCONUS locations are not a consideration in this thesis and project stability was described in Chapter II as an occurrence that may equally effect each EFD. As

statistics on stability were not available for each EFD, this influence is difficult to quantify. Of the other major factors such as "visibility," economy of scale, dispersion of field offices, turnover of personnel, etc., each EFD could claim one or more of these factors as unique. Resources were simply not available for this author to further investigate and attempt to quantify the effect of these factors on each EFD's staffing requirements. Chapter II section D.1 does describe these factors and suggests their general effects on staffing. However, this observation will be made. Interviews with senior NAVFAC personnel generally indicated that they were not completely aware of, or not using as the basis of judgment, many of the factors outlined in Chapter II. A recommendation in this area will be presented in the concluding chapter.

E. ALLOCATING RESOURCES AMONG DIVISIONS

Interviews with EFD Division Directors on staffing methods yielded both encouraging and disappointing results. One Division Director stated that he had no idea how personnel resources were allocated to his Division. Consider the following excerpt from the report "Organization and Staffing of NAVFACENGCOM Contracting Offices:"

> Third, the supervisors in the 02 organization are almost always so caught up in the crush of daily business that they defer, or fail to address altogether, the desired staffing and skill levels needed to do a truly adequate job. ("When you're fighting off alligators, you forget that your original goal was to drain the swamp.") What actually happens is that the typical 02 operates with a given staffing level indefinitely until the workload increases to an intolerable volume, at which time the 02 goes to the 09A and pleads for another body or two. [Ref. 27: p. 5]

The intent of this section is not to precisely define methods for each EFD Acquisition Organization Division to determine its manpower requirements. General methods were outlined in Chapter III, and specific methods are really potential subjects for future theses. However, it is recognized that the task confronting the head of an EFD Acquisition Organization is not an easy one when making decisions on allocating resources among his Divisions. Therefore, some guidance will be provided here.

A major theme of Division-level budgeting is that it tends to be incremental. Previous years' Division staffing levels will more than likely not be reduced. Consider that the overall trend in Acquisition Organization staffing has been an increase every year for the past six years (the length of time covered in this research). Therefore, in

allocating these incremental resources it is generally a matter of assessing incremental increases in Divisional workload. Nothing fancy. Just a general projection of how much more workload will be done this year than was done last year. If Division X is projecting a 10% increase in workload and Division Y only a 2% increase, then the job of the Acquisition Organization Head in allocating those incremental resources is made that much easier. **Unfortunately, most Division Directors interviewed did not completely recognize this situation.**

NORTHERN Division had the most unique and innovative means of determining staffing levels for their 05 Division ROICC offices. Their system will briefly be described here primarily as an example of the concept of using an increase in relative workload to determine resource allocation.

NORTHDIV divided its field (ROICC) office workload into two primary categories: procurement efforts dealing with the contracts administration workload, and administration effort dealing with construction management. For each ROICC office points were given for total procurement effort based on numbers and types of contracts awarded, and administration effort based on numbers and sizes (dollar values) of active construction contracts. Points were then totaled for each office. The "best" office was then selected for use as the benchmark office. This office was judged the most properly staffed for its workload by the EFD headquarters staff. All other offices were then staffed based on their total points compared to the benchmark office. For example, if the benchmark office had 100 workload effort points and was staffed with 10 people, then if another office was projecting 150 workload points they would be staffed with 15 people. Similarly, relative changes in Divisional workload could easily be translated into changes in manpower requirements. For example, workload effort points summed for the entire division projected for the upcoming year could be compared to those for the previous year, and thus justification would exist for incremental staffing changes. The system is simple, but it enables management to make informed decisions on manpower staffing. [Ref. 28]

The quote at the beginning of this chapter by Albert Einstein highlights the manpower budgeting process at the Divisional level. As described in Chapter III, managers should aim for manpower forecasting systems that are credible, significant, and cost-effective.

F. CHAPTER SUMMARY

This chapter has addressed the significant aspects of NAVFAC's three tiered manpower demand forecasting system. The POM-level system is ideal in methodology. However, the need for updating the weighted WIP coefficients must be recognized.

The same SHORSTAMPS staffing model can be accurately used in allocating resources among EFDs. Judgment on the part of NAVFAC Program managers in interpreting outside staffing factors plays an important role in supplementing statistical analysis for allocating resources among the EFDs. Improved accuracy of the SHORSTAMPS model is possible by using more recent data. Similarly, Program managers must keep abreast of the outside factors that influence staffing in order to make accurate judgments.

At the Division level the simplest means of expressing relative changes in workload is the best management tool available to facilitate manpower forecasting.

V. CONCLUSIONS, RECOMMENDATIONS AND AREAS OF FURTHER STUDY

This thesis has sought to both portray the importance of manpower demand forecasting for the Naval Facilities Engineering Command and the difficulties and complicating factors affecting the determination of staffing requirements, as well as to provide methods by which forecasts can be made. Three primary conclusions are presented as a result of this research.

Firstly, the method by which NAVFAC forecasts staffing requirements at the POM level is considered valid. However, because a data base of only one year was used for developing the staffing model, the accuracy of the model can be improved by using more recent data over a period of several fiscal years. In this thesis, analysis has shown that at least three of the regression coefficients in the SHORSTAMPS model have changed significantly since the model's development.

At the second tier of NAVFAC's manpower budgeting system--allocation of resources among the EFDs--research by the Army Corps of Engineers has shown that a staffing-standard equation or model can be used to forecast approximately 80% of an EFD's requirements. The remaining staffing requirements are influenced by factors that are difficult to quantify and are best left for judgment decisions. These factors were described in detail in Chapter II. NAVFAC's SHORSTAMPS staffing-standard model, used with relative accuracy at the POM level, is subject to greater distortion at the EFD level because of differences in mixtures of WIP fund sources among the EFDs. The NAVFAC model still has a high degree of accuracy, but given the occurrence of particular changes in WIP-fund-source-mixtures, understaffing in relation to "true" workload could result. Updating the model's weighted WIP coefficients will result in enhanced manpower requirements forecasting accuracy.

The *general* influences of outside staffing factors was addressed in this thesis. Further research is necessary to properly weight these factors as to their effect on staffing requirements. Research indicated that many of the factors presented in this thesis were not adequately considered when resources were allocated among EFDs, because their effects, or their existence, were not known. It is recommended that NAVFAC convene a workshop similar to that done by ACE to specifically address and weight these factors. Given that there are only six EFDs, the scale of the workshop

need be much smaller than that of the ACE workshop, which was attended by more thatn 25 District Officers.

This thesis also addressed the anomaly presented in Table 1 which apparently showed that WESTDIV was having to accomplish more WIP than NORTHDIV and SOUTHDIV combined, with 20% fewer personnel resources. In "real" terms this thesis shows there is only a five percent difference in staffing between the EFDs, thus allaying any major concerns about the adequacy of NAVFAC's manpower staffing system.

At the third tier of the budgeting system research indicated that methods by which an EFD Commander can base his decision to allocate resources among his Acquisition Organization Divisions can be improved. One such method was presented in this thesis. This is an area in which further research, specifically directed at determining staffing requirements for a single Division such as 04 or 02, could make an important contribution to NAVFAC management. The Contracts Division in particular lends itself to development of a staffing standard that could easily be used NAVFAC-wide. Research in the form of a thesis could perform an Efficiency Review and then develop a staffing-standard by performing a time study for each major element of workload.

Finally, a thesis might study the *costs* of understaffing. Chapter II addressed the absence of generally accepted indicators of *quality* and its effect on staffing. A thesis might attempt to quantify the costs of manpower shortage such as increased change orders (only two years' data was examined in this thesis, and then for only one Division), number of claims, polling customer satisfaction with a new facility, increased turnover of personnel caused by over-work, or other indicators. Accurate quantification of these costs would facilitate proper interpretation of Tables 16 and 19 and improve the staffing process.

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